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ECONOMICS AND THE BEHAVIORAL SCIENCES

Economics and the Interdisciplinary Problem

The question of the relationship between economics and other behavioral sciences such as anthropology, psychology and sociology admits of two basically different answers depending on one's conception of the nature and scope of economics. If economics is conceived as a pure science which derives its theoretical conclusions from the logical analysis of *a priori* postulates (subject to direct verification by introspection) no useful purpose can be served by an attempt to integrate economics with those behavioral sciences which operate with concepts and hypotheses whose content and validity is at least in part given a *posteriori* and hence subject to indirect confirmation or refutation by empirical factual observations. Such an explicit denial of any connection between economics and the empirical behavioral sciences is in harmony with the views of those economists for whom economics is the central and most important part of a general science of human action or choice (hence "praxeology"). Thus, in the words of L. Von Mises (p. 49)[1]:

> "The scope of praxeology is the explication of the category of human action. All that is needed for the deduction of all praxeological theorems is knowledge of the essence of human action. It is knowledge that is ours because we are men; no being of human descent that pathological conditions have not reduced to a merely vegetative existence lacks it. No special experience is needed in order to comprehend these theorems, and no experience however rich, could disclose them to a being who did not know *a priori* what human action is. The only way to a cognition of these theorems is logical analysis of our inherent knowledge of the category of action. We must bethink ourselves and reflect upon the structure of human action. Like logic and mathematics, praxeological knowledge is in us; it does not come from without."

In other words, a science of economics which aims at a universal theory of human action derived logically from introspectively verified postulates, makes unnecessary and, indeed, meaningless the task of taking notice of the growing body of knowledge in anthropology, psychology and other behavioral sciences. In fact, if we regard eco-

1. See bibliography at the end of this paper.

nomics as a pure science of choice concerned with the explication of human action on the basis of introspectively verified postulates (such as the existence of a scale of preferences and an intrinsic rationality in adapting means to ends in accordance with a given preference scale) it would occupy a unique position among the various social disciplines in as much as its postulates are directly verified and neither call for, nor admit of further validation. That is to say there can be no relationship between a pure science of economics and other behavioral sciences because the two are concerned with entirely different types of inquiry.

In fact, even if the basic postulates concerning human action are considered to have at least in part an empirical basis the analysis of human behavior in the light of a given preference system and the maximization principle enables the economist to avoid any commitments to the findings of the behavioral sciences. For as Duesenberry (p. 15) pointed out, the preference system analysis "in its present form . . . is a more or less deliberate attempt to sidestep the task of making psychological assumptions. It has the advantage that it allows one to avoid getting out on a psychological limb which may collapse at any moment". Thus, whether we believe that our postulates concerning human behavior are verified by introspection (and hence do not require any further confirmation "from without") or whether we believe that the postulates rest, at least in part, on an empirical basis but consider it unnecessary to make inquiries into the motivation of the individual, the system of deductive theorems arrived at will possess only a minimum of factual content and the question of its predictive significance for concrete empirical situations is likely to remain problematical no matter how great the precision and certainty of its theoretical conclusions.

If, on the contrary, economics is conceived as a science operating with concepts, hypotheses and generalizations which are subject to confirmation or disconfirmation by empirical observations, it is not only possible but necessary to utilize in economic analysis the findings of other sciences dealing with human behavior. In fact, ideally speaking, it would be necessary, and indeed essential to relate to and to base such an empirical science of theoretical economics upon a science of man and human behavior as it may ultimately emerge from the combined findings of anthropology, psychology and sociology. This

was the methodological conviction which all classical political economists shared with the originators of a secular social science as it emerged from its formative stages. Grotius, Pufendorf, Hobbes, Locke, Quesnay and A. Smith were all agreed that a science of politics and political economy could be erected only upon the foundation of a concept of man and human behavior. And such is still the general methodological orientation of all those economists who are working in the tradition of either the historical or the holistic school of economics associated with such names as Schmoller, Veblen, W. C. Mitchell, Spiethoff, Schumpeter, K. Polanyi, Katona and many others. For these economists it has always been axiomatic that economic science must go beyond the purely formal explication of the logical character of the means-ends relationships. In order to be relevant for the interpretation of actual relationships and sequences of events under concrete historical and institutional conditions economics must be "substantive" in the sense of taking its departure from man's actual needs and his dependence upon and interaction with his natural and social environment (K. Polanyi). Such a "substantive" empirical science of economics must utilize the findings of the behavioral sciences in the formation of its basic premises.

The nature of such an empirical science of theoretical economics differs substantially from that of a system of economic theorems deductively arrived at from introspected valuations and axioms. It neither aims at nor achieves universal validity and absolute certainty; its factual content and empirical significance are always subject to further validation and revision in the light of new findings of the empirical behavioral sciences. For, such a science of economics can never be absolutely certain of the validity of its conclusions since new findings concerning human behavior may invalidate or qualify its basic premises and call for new formulations. Its realism and empirical relevance are therefore bought at the price of a tentativeness of its conclusions which it shares with other empirical knowledge. Just as our contemporary cognition of the structure of the physical universe lacks the universality and absolute certainty of classical physics, economics as an empirical social science stands ready to revise its conclusions in the light of new empirical observations and findings.

The last 20 to 30 years have witnessed new departures in the study of man and great advances in the scientific interpretation of human

behavior. These new developments—no matter how tentative the propositions of psychology, anthropology and sociology may still be at the present time—call for a careful survey of the findings of these behavioral sciences from the point of view of their specific significance for economic analysis. Such a survey would enable the empirical economist to assimilate to his reasoning and to the conduct of his specialized inquiries those results of the behavioral sciences which are relevant for economic analysis.

Methods of integration

Obviously, the first question which calls for an answer is *how* one assimilates the findings of another discipline or for that matter of a group of related sciences to one's own work? This is a question of method and cognition which must be answered before the interdisciplinary problem between empirical economics and the newer behavioral sciences can be approached. Once the general method of integration is agreed upon it would be necessary to determine which of the findings of anthropology, psychology, sociology etc. are of particular relevance to economic theory. Obviously not every finding of these behavioral sciences is likely to be of equal significance for the conduct of economic research. The question calls for an answer from the point of view and in the light of the specific research tasks of contemporary economic analysis.

Turning first to the urgent and important question of the method of assimilating the results of the newer sciences of human behavior to economic analysis, it appears that much could be learned from a general survey of the manner in which such assimilation (integration) has taken place in the past. For example it would be important to show how earlier attempts of establishing a secular system of social knowledge proceeded from the concept of the "natural man", human behavior and natural law. For even if we can no longer accept the particular concepts of man and human behavior which Grotius, Pufendorf, Hobbes, Locke or Adam Smith utilized in the erection of a system of economic and political knowledge, the basic methodological procedures of these early social scientists have not lost their significance for the solution of the contemporary interdisciplinary problem. Furthermore, it would be of interest to indicate

how the earlier political scientists (including the classical political economists) made use of the general modes of thinking and of the basic concepts and findings of the physical sciences. Much is, of course, known about the manner in which the natural sciences have influenced the various social disciplines. Much more could still be learned from a systematic inquiry into the cross-fertilization of the various branches of knowledge in the past.

A judicious reinterpretation of the history of social thought as part of the general stream of thought both from the point of view of their continuous cross-fertilization and their final specialization and compartmentalization is likely to yield results which may be directly relevant for the contemporary problem of interdisciplinary cooperation and integration in the social sciences. Such a reinterpretation of the history of social knowledge would have to pay special attention to the role of analogical reasoning in the history of social theory and will finally have to concern itself with the merits and limitations of various current proposals for the integration and unification of social knowledge

Among these proposals the following seem to be of special interest: Integration in terms of a so-called "deeper dimension" of a new *Weltanschauung;* integration by historiography; integration by interdepartmentalized research on specific problems; unification of knowledge in terms of a common methodology and unified scientific language; integration by reduction and the use of analogies and finally the unification of knowledge in terms of common (integrating) concepts. The author believes that the most fruitful approach to the interdisciplinary problem between economics and the behavioral sciences consists in the search for and employment of common denominator concepts or of integrating constructs which because of their comprehensiveness contain and cut across the subject-matter of several disciplines[2].

2. The epistemological problems raised by such an approach to the interdisciplinary problem have been investigated by NORTHROP (1950), MARGENAU (1950) and KLUCKHOHN (1950) and with special reference to the problem of the integration of social knowledge by the writer in a forthcoming study entitled "*Toward an Integration of Social Knowledge*".

The Germinal Questions of Contemporary Economic Analysis

The second and more specific question as to which of the particular concepts and findings of the newer sciences of human behavior are of special importance to economics can be answered only, as we indicated before, in the light of a clear understanding of the specific research tasks of contemporary economic analysis. As we see it the truly germinal questions of economics are all concerned with the behavior of individuals or groups of individuals acting in different situations and the repercussions of such action upon the economic process in general and the individual in particular. It will be convenient to view human behavior at the following four levels: consumers' behavior, the behavior of workers and labor unions, the behavior of enterpreneurs, investors and innovators and the behavior of various political units or government agencies.

The behavior of consumers: We need generalizations concerning consumers' behavior particularly with regard to their spending patterns which takes into account the effect on consumers' expenditures of such factors as culturally conditioned drives for higher levels of consumption, accumulated savings, changes of incomes in the past, expectations of future prices and anticipations as regards future changes of personal income. Techniques for such factual investigations into consumers' spending patterns are being developed in various quarters and it is reasonable to expect that we are well on the way to the formulation of a more "empirical" theory of consumption and savings based upon actual field studies.

There can hardly be any doubt that these studies would gain in scope and relevance if they could be related to an integrating concept of man (and human culture) to which reference has been made before. From such a concept we could expect to derive not only an empirical concept of human needs including their physiological basis (see C. R. Noyes), but also a more satisfactory understanding of the manner in which specific internalized value-orientations and social norms and their manipulations as well as various group influences and expectations may affect the allocation of consumers' incomes to different purposes under different conditions. In short, the whole concept of the so-called economic motivation of human behavior which has attracted attention throughout the last decades must be

approached afresh in the light of the more sophisticated conceptual frameworks of the newer behavioral sciences.

The behavior of laborers and labor unions: We need a more profound understanding of the response of laborers to various incentives especially in connection with the problem of labor mobility. We need information as to how laborers arrive at their decisions on the actual labor market as far as the choice of new jobs and the retaining of old ones is concerned. (For an empirical study of some of the factors which seem to determine such choices as well as the prevailing lack of information about job opportunities see L. G. Reynolds and Joseph Shister, 1949.) Closely related to the question of the determinants of the decisions of individual workers is the problem of the decision-making process in labor unions. It is not difficult to see that decisions of labor unions (and employers' organizations) are taken in a field of interpersonal power relations in which the pursuit of security (in all its manifestations) is interrelated in a complicated manner with the pursuit of satisfaction such as the desire for higher wages. Such non-wage objectives as the desire to maintain and expand the size of the union relative to employers and to rival unions, the need of the union leadership to uphold its power against rival cliques, as well as political aims do not merely represent in a vague manner parts of the economic and cultural environment in which the struggle for a larger share of the national product takes place, but belongs to the specific determinants of union behavior at any given time. To single out wage objectives as the determinants of union action is to fall into the trap of a traditional concept of social causation which attributes causal potency to one isolated factor without seeing the "field" or interactional character of the causal nexus.

Enterpreneurial behavior: What has just been said about the need for an understanding of the behavior of workers and their groups applies *pari passu* to employers and enterpreneurs. We need a "substantive" theory of the behavior of large corporate structures; we also need psychological premises which do not ignore the fact that enterpreneurial action particularly the decision to invest is a highly complex one which is neither automatic nor clearly dependable in the sense that it can be explained with reference to any single factor such as the level of the interest rate or changes in the demands for finished goods. What is required, for example, is an understanding of how

those spontaneous waves of optimism and urges to action, to which Keynes referred, come into being, of how they are sustained and may finally falter and break. This is doubtless a psychological problem of the first order to which we do not do full justice by reiterating merely what John Stuart Mill already knew, namely that it is not profits but the expectations of profits which tend to be equalized in different occupations under competition and that it is these expectations which play a major role in enterpreneurial actions. Expectations and the so-called marginal efficiency of capital are essentially psychological determinants of enterpreneurial decisions which require explanations and must not be treated simply as data. We have as yet no theory of how expectations are formed and transmitted and without such a theory we are unable to formulate an adequate theory of investment decisions.

Business cycle theory: We need to develop a conceptual framework in terms of which it may be possible to utilize our findings concerning the determinants of the behavior of each of these three categories of individuals and groups for the analysis of those cumulative and self-sustaining movements of expansion and contraction to which we are accustomed to refer as business fluctuations. The general significance of contagious group and mass influences on human behavior for the study of business fluctuations has found repeated recognition in various "psychological" theories of cyclical movements. We need a more systematic treatment of the socio-psychological factors and of the cumulative and contagious movements to which they may give rise in the light of the relevant findings of social psychology and psychology and we must face the task of integrating them into the theoretical apparatus used for the explanation of business fluctuations[3].

The behavior of political units: The increasing importance of public budgeting and fiscal policy, the persistent growth of the scope of the public economy (whether measured in terms of the relative number of people employed, or relative amounts of income originating in the public sector or the proportion of public expenditures to gross national product or expenditure) makes it increasingly necessary to place the study of the formulation of collective decisions in the center of

3. See W. A. Jöhr's successful assimilation of certain basic concepts of social psychology to the economic interpretation of cumulative business movements of expansion and contraction.

economic analysis. For this purpose we need a realistic theory of political processes based upon a concept of power and a basic understanding of the psychological and sociological roots of political behavior.

The effects of production, distribution and consumption on man: Perhaps the most crucial problem with which economists (and other social scientists) have to concern themselves is the question as to the effects of production, distribution and consumption on man and the development of the human personality. This is a question on which modern economic analysis has hardly anything to say for the simple reason that it is neither equipped to answer it nor even willing to raise it. And yet there can be no more important question calling for an answer if we want to make our inquiry into economic processes relevant for the solution of the practical problems of the contemporary world.

The Areas of Behavioral Research most useful to Contemporary Economic Analysis

Thus far we have been concerned with the central research problems in contemporary economic analysis. Ideally speaking, it would now be necessary to examine the relationships between the various terms and concepts used in economics and other behavioral sciences in order to ascertain what the different disciplines have in common and where they are dealing with distinct aspects of the problem of human behavior. Having thus established lines of communication it would then be possible for the economist to adapt and borrow what is relevant and to reject what is distinct and without bearing on his specific problems. In this way the road would be open to the much needed cross-fertilization between the empirical behavioral sciences and the way prepared for the ultimate conceptual integration required for a unified science of man and society. To repeat, what would be needed is a thorough examination of the relationship between the various strange vocabularies and seemingly unrelated conceptual frameworks which the different behavioral sciences have found useful for the analysis of what is the common problem of all; namely, the behavior of social groups and individuals who as members of larger social entities interact with specific situations in which they find themselves.

However, for the time being we cannot hope to do more than to indicate in a tentative manner some of the concepts developed by the various behavioral disciplines which appear to have the greatest utility and relevance for the above mentioned research problems of contemporary economic analysis with a view to establishing merely the most obvious points of contact between economics and related areas of behavioral research.

A science of economics which is prepared to view individual behavior within the context of a structured group setting and in reciprocal interaction with specific environmental conditions can draw upon a considerable number of partly overlapping concepts and conceptual frameworks from several behavioral sciences. Let us approach these concepts by first outlining briefly what an empirical science of economics needs to know. Above all, such a science of economics requires an understanding of the nature of the recurrent human needs calling for gratification and the manner in which these needs arise and find temporary satisfaction. In short, we must be clear about the "inner" biological and genetic determinants of human behavior. In other words, the realization that all behavior is social behavior (in the double sense that it takes place within the context of a structured social entity and in reciprocal interaction with a specific environmental situation in which the individual is placed) must not dim the economists' awareness of the relative constancy of the genetic structure and the biological determinants of human nature and human conduct. In this way we may be able to protect ourselves against a view of human nature which considers the individual as infinitely malleable and capable of adapting himself passively to all kinds of human and non-human environments without adverse effects. In this sense it would appear that neither economics nor any of the other behavioral disciplines can ever completely dispense with certain basic concepts and conclusions of biology concerning the nature of the human organism.

The second task which follows from the nature of the central problems of economic analysis is to arrive at a clear understanding of the caracter of the structured group or the organizations of which the individual is a part and within which he functions. As we have endeavored to show the most important groups and organizations from the point of view of the economist are labor unions, different

types of corporate structures, employer and farm organizations, consumer's groups, the family and perhaps other spending units. These groups and organizations constitute social or collective entities which need to be distinguished from the broader and more inclusive environments such as the structure of the economy, the social system, the political framework and the culture as a whole (by which we mean the sum total of man-made techniques and tools, the symbolic universe as well as the ideas, attitudes, customs and the corresponding behavior patterns of a society). Like these more inclusive environments the economic groups and organizations mentioned above are "real" in the sense of having the effect of influencing and patterning the behavior of individuals. (That is to say they are "real" in the sense in which K. Lewin spoke of groups as "real" if, as and when they have real effect.) Because the behavior of consumers, laborers and enterpreneurs takes place within a structured group setting, the economist cannot avoid turning to those relatively recent and still overlapping conceptualizations in terms of which these social groups and their essential properties and effects on individual behavior have been analyzed by different behavioral sciences (notably sociology, social psychology and psychology).

The questions which are of particular interest in this connection center around two interrelated problem areas: 1. The nature of the relationship between the individual and the groups and 2. the nature and determinants of group decisions. The study of the relationship between the individual and the group has long been an area of research claimed by two neighboring behavioral sciences: psychology and sociology. Whereas psychologists tended to concern themselves with the nature of the relationship from the point of view of the single individual, sociologists tended to view the relationship as a function of the inclusive group entity (see T. M. Newcomb, p. 1–5). While these different approaches have kept the two behavioral disciplines apart and prevented each from making much headway toward a unified science of human behavior for many decades, the situation appears to have changed in recent years. The latest developments in both these behavioral sciences seem to point in the direction of greater interpenetration by extending conceptual bridges from either end of the once separated territories. Just as psychologists have come to recognize "the social determinants" of behavior, sociologists have

discovered that there is much to be learned from the contributions of psychology to the understanding of human behavior. The upshot of this interpenetration has been the gradual emergence of a new and more sophisticated version of social psychology whose concepts and findings seem to be directly relevant for the elucidation of the relationship and interaction between the individual and the more inclusive group entities—as far as their relevance for the interpretation of the behavior of consumers, workers and enterpreneurs is concerned.

The explanation of the interaction between the individual and the group will have to center around the manner in which this relationship is established and maintained. The concepts which have proved useful for the explanation of the nature of this interaction consider the relationship between the individual and the group as a specific form of communication and concensus which establishes, maintains and constantly renews the ties between the individual and the more inclusive collective entity. Among the various concepts helpful for an understanding of the individual-group relationship are the following: The "self" and the "social-self" with its emphasis on the internalization of social norms and social value-orientations and their organizing functions; status, position and roles, common perception and common expectancies and self-reenforcing attitudes in response to common situations. These concepts and the related theories may provide at least the beginning for a realistic and empirically more or less verifiable interpretation of the behavior of consumers, laborers and enterpreneurs in response to changes of prices, wages, profits and costs and may also throw light on the genesis of common and contagious reaction patterns in situations marked by general uncertainty and the resulting "crowd behavior" often observed in the conduct of large groups of consumers, investors and speculators.

As far as the second aspect of social action (namely the nature and determinants of group decisions) is concerned, empirical-substantive economics will have to take account of the (sociological) theory of organization. This theory which owes much to Max Weber and is being further elaborated by current researches raises a number of questions which may prove to be relevant for the theory of the firm and the enterpreneurial behavior of corporate structures as well as for the interpretation of the action of unions and similar organiza-

tions. Among these questions are the following: The origin and basic modes of operation of organizations; the nature of their internal hierarchy (intra-organizational tensions, the settlement of internal disputes); the role of financial incentives as against such factors as social prestige and power; the genesis of organizational goals and the formulation of organizational decisions including the highly important problems of centralized versus decentralized decisions (their economies and diseconomies) and the tendency toward managerial and bureaucratic control. Concepts and theories concerning the emergence of leadership in structured organizations and groups can be expected to throw light on the manner in which leadership operates in large corporate structures and on the nature of the collective action in such important economic groups as labor, farm, management as well as other professional organizations. The concept of democratic leadership (defined in terms of participation and persuasion rather than authoritarian control and submission) may ultimately permit us to draw up valid criteria and norms for the establishment in industry and other groups (*e.g.* labor organizations) of work-processes and human relations which provide a maximum of human incentives without affecting human personality in an adverse way.

The third task which follows from the definition of the behavioral problem is the conceptualization of the environmental situation. Here the difficulty is that the situation is not simply an objectively given series of economic variables (*e.g.* rising prices, changing interest rates) but rather a constellation of factors as they are perceived in terms of the particular subjective attitudes of acting individuals or groups of individuals. In short, what is required is a distinction between the objective situation and the perceived situation and the realization that different individuals may perceive the same objective situation in a different manner. Thus an individual or group of individuals who have experienced inflationary price rises in the not too distant past are likely to perceive the same objective price and monetary constellation in a different way than others who lack such experiences. (That is not to say that past experiences are necessarily the only factors which determine our perception and our attitudes in the present.) In any event, in trying to understand the environmental situation to which the individual (or groups of individuals) reacts, the economist will find it useful to assimilate to his own reason-

ing some of the basic concepts used in contemporary theories of perception.

Apart from this, economists will have to view economic situations not in isolation but within the wider context of the social and political structure, that is to say in the light of the distribution and use of political power between different groups, and their political behavior. The concept of political power has lost almost all standing in formal economic analysis due no doubt to the implicit belief that competition offers an automatic solution of the abuse of power by a few (J. K. Galbraith). The realization that actual market situations are rarely perfectly competitive and contain usually elements of monopolistic power which can be met only by political counter-power (either by the government or by countervailing private groups or both) make it more necessary than ever for the economist to devote some attention to the analysis of power and power conflicts. Such an analysis would have the twofold objective of assimilating the phenomena of political power to economic analysis and to provide a conceptual framework in terms of which it may ultimately be possible to deal with the political decisions and collective choices underlying the formulation of economic policies. To be able to do so is becoming increasingly important in view of the growing significance of the role of governmental regulations in economic life and the increasing scope of the public economy in comparison to that of the private sector.

In conclusion we may say that since all human action and particularly the behavior relevant for economic analysis must be regarded as a form of social interaction between an individual (or groups of human beings organized in structured entities) and the situation in which the individual finds himself, the general direction of the economists' effort of finding useful and relevant behavioral concepts for the interdisciplinary tasks ahead is clear: We must turn to those areas of research and partly overlapping disciplines which operate with conceptual frameworks in which the social (interactional) character of human behavior is fully recognized without committing the error of viewing human conduct merely as a passive adaptation to environmental conditions.

The Science of Man and the Humanization of Economics

In the preceding two sections we have set forth what we consider to be the important research problems of contemporary analysis and some of the concepts and theories of the behavioral sciences which we believe to be useful for an integrated attack on those problems.

The next and final task which concerns us is the definition of the scope and nature of economic analysis as one of the behavioral sciences. This task can be approached only in the light of an understanding of the nature of the economic problem with which economic analysis has to deal. For our purposes it will be sufficient to say that the specific economic problems and the related studies of human action arise from the fact that man has to gratify his recurrent needs by interacting with a natural and cultural environment which offers him the means for such gratification only at the price of overcoming various resistances through human effort, improved techniques, specialization and exchange (C. R. Noyes). Viewed in this broad fashion the economic problem (as a problem arising from and centering around the gratification of recurrent human needs and the struggle against scarcity) becomes a general problem of human existence. To view the subject-matter of economics in this manner is equivalent to saying that the science of economics can never be an autonomous science. On the contrary, the science of economics must be conceived from the very outset as an integral part of a broader science of man and culture. Once this proposition is accepted in principle it is possible to restate the program of the interdisciplinary task at a higher level of generalization than has been possible so far. As far as economics is concerned the interdisciplinary problem becomes one of relating economic analysis to the concept of man and culture as it may eventually emerge from the integrated findings of the behavioral sciences[4].

4. Similarly, just as the science of economics must build conceptual bridges to the science of man, the emerging science of man and human behavior must never lose sight of one of the most fundamental conditions of all human existence and human behavior: namely the aforementioned fact that the environnement offers the potential means for the gratification of recurrent wants not freely but only at the price of overcoming various resistances by human efforts and improved techniques.

The practical implications of this view of the interdisciplinary problem may be spelled out in greater detail. For, if we share and take seriously the methodological convictions of the classical political and economic thinkers who considered it as axiomatic that all social theory had to be based on and nourished by a concept of man and human behavior it follows that the most fundamental and most urgent task of economic analysis is to overcome what has been called the withdrawal of the living human being from economic theory (F. Perroux, p. 10). Instead of confining itself to the search for levels of equilibrium between efforts (costs) and benefits (returns) economic analysis will have to start again from the nature of man and, what is more, must study the repercussions which the benefits and sacrifices involved in production may have on man and the human personality under given historical and institutional arrangements.

If this is granted, the next question obviously is how and where can such a general concept of man be found. The answer can only be that such a concept has to be constructed in harmony with the improved understanding of human behavior emerging from some of the findings of the newer behavioral sciences. Again, this is not to say that everything that these sciences have produced in the form of preliminary hypotheses and clinical findings must necessarily be reflected in the concept of man. If this were so we would probably never be able to develop a coherent concept of man and human behavior. Moreover, there are many areas of psychological and sociological research which have only very little if any relevance to economic analysis. In fact, there seem to be many highly speculative formulations in some of the newer behavioral sciences which may have no other purpose than to provide defenses against disconfirmation by factual observation. While economic analysis cannot and need not take into account every detail and refinement of the behavioral sciences it must and should assimilate those findings and modes of thought which have a direct bearing on the central questions of the behavior of individuals and groups in connection with the struggle against scarcity. Perhaps, the most important requirement of an adequate concept of man is that it views human behavior not in terms of isolated drives but as responses of the organism as a whole, to the total situation within which the individual acts and functions. Human action and particularly the behavior relevant for economic analysis

takes place in a field of interpersonal relations characteristic of a particular culture. That is to say in order to anticipate or "predict" human behavior it would be necessary to develop a concept of human nature and human behavior which includes the interaction of the individual with his specific human and non-human environment. Such a concept would have to include those internalized and more or less unconscious value-orientations and social norms which the individual tends to absorb during the process of acculturation and which influences behavior in virtually all situations and at all levels.

More specifically, we believe that the concept of human nature and human behavior must be a "holistic" one in the sense of being capable of taking adequate account of the totality of factors which influence human behavior. No theory of human behavior which operates with single determinants (whether the pursuit of wealth, or any other partial "drive") is likely to prove adequate for the explanation of human behavior at any level and under any of the various conditions under which man acts as a consumer, worker, entrepreneur, or member of a social or political group. In fact, any attempt to account for human conduct in terms of single drives or determinants can only yield an oversimplified picture of human behavior by singling out one factor from a number of determinants and attributing causal potency to it. A holistic concept of man and human behavior seems to emerge from the findings and writings of several cultural anthropologists and sociologists and particularly from such psychologists as K. Goldstein, H. S. Sullivan, E. Fromm and A. Maslow to name only a few among the many writers who have worked along the lines we consider most fruitful for the interdisciplinary problem as viewed from the standpoint of economics.

A holistic concept of man leads directly to and indeed contains the concept of culture. That is to say that man, due to basic biological needs and his social nature, is a culture building animal and is, at the same time, the product of his cultural environment. The implications of the holistic concept of man and culture for economic analysis are perhaps more clearly seen if we bring them in relation to such important auxiliary concepts as social interaction, acculturation and social learning, value-orientations, and social norms, social groups and social organization. All of these auxiliary concepts, as we have indicated above, can be shown to be relevant for a realistic analysis

of the behavior of consumers, workers and enterpreneurs and their groups. In short, then, a general concept of man and human behavior is relevant for virtually all problems with which economic analysis is concerned. From it economics would be able to derive its special categories and to formulate its specific problems which, as we have pointed out, arise from the fact that recurrent human needs call for satisfaction obtainable by overcoming the resistances of an environment which offers the potential means for such gratification only at the price of human effort.

Such a "humanization" of the science of economics by means of an assimilation to its specific purposes of a validated concept of man and human nature and the inclusion of an inquiry into the repercussions of institutional arrangements on human development also points the way, we believe, to the solution of the problem of integration of social knowledge in general. In fact, no genuine integration of social knowledge can dispense with the concept of human nature and human behavior and no social analysis must shy away from the question of what given institutional arrangements do to man and human growth. In this sense we are led to the conclusion that the task of basing its analysis of social processes upon a generalized and empirically (though not necessarily experimentally) verified concept of man and thus of relating social knowledge once more to the knowledge of human behavior must never again disappear from the agenda of social research.

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SUMMARY

As long as economics is conceived as a purely formal science of human action (praxeology) the basic concepts and findings of such behavioral sciences as psychology, sociology and cultural anthropology will be considered as irrelevant for economic analysis. However, if economics is considered as an empirical (substantive) science which starts from actual human needs and places man's dependence upon and interaction with his natural and social environment in the center of its investigation, the basic concepts and conclusions of the behavioral sciences cannot be dispensed with.

The question then arises as to the proper method by which the results of one field of inquiry can be utilized in another. Such integration is possible only if we find or formulate common denominator concepts sufficiently broad to contain and cut across the subject-matter of several social disciplines. Which particular concepts are likely to prove useful for a "substantive" science of economics depends upon the nature of the central research problems of contemporary economic

analysis. Since these germinal questions of modern economics are all related to the behavior of social groups and of individuals acting as members of structured social entities the basic concepts and findings of social psychology and cultural anthropology are likely to prove most useful for the substantive-empirical economist.

Having outlined the major concepts which have proved helpful in the analysis of group decisions and the individual-group relationship the article concludes by setting forth the thesis that a substantive science of economics must be conceived from the very outset as an integral part of a science of man and culture. Such a "humanization" of economics would have the task of placing the living human being once more in the center of economic analysis and, at the same time, would provide a starting point for the solution of the urgent task of integrating our contemporary knowledge about man and culture.

ZUSAMMENFASSUNG

Nationalökonomie und die Wissenschaften vom menschlichen Verhalten. So lange die Nationalökonomie als eine rein formale Wissenschaft vom menschlichen Handeln (Praxeologie) begriffen wird, erscheinen die grundlegenden Konzeptionen und Erkenntnisse der Verhaltenswissenschaften wie der Psychologie, der Soziologie und der Kulturanthropologie für die ökonomische Analyse als irrelevant. Wenn indessen die Nationalökonomie als wirklich empirische Wissenschaft betrachtet wird, die von den tatsächlichen menschlichen Bedürfnissen ausgeht und die Abhängigkeit des Individuums von seiner natürlichen und sozialen Umgebung sowie deren Wechselwirkung in den Mittelpunkt ihrer Forschungen stellt, so können die grundlegenden Konzeptionen und Folgerungen der Verhaltenswissenschaften nicht übergangen werden.

Es stellt sich dann die Frage, durch welche Methode die Ergebnisse des einen Forschungsgebiets im andern verwendet werden können. Eine solche Integration ist nur dann möglich, wenn für die verschiedenen Konzeptionen gemeinsame Nenner gefunden oder formuliert werden können, die weit genug sind, um den Gegenstand verschiedener Sozialwissenschaften zu umfassen. Welche Konzeptionen sich für eine wirklich empirische Wissenschaft als nützlich erweisen dürften, hängt von der Natur der zentralen Forschungsprobleme der heutigen ökonomischen Analyse ab. Da alle diese grundlegenden Fragen der modernen Nationalökonomie sich auf das Verhalten sozialer Gruppen und des Einzelnen beziehen, die als Glieder sozialer Gebilde von bestimmter Struktur handeln, dürften die grundlegenden Konzeptionen und Erkenntnisse der Sozialpsychologie und der Kulturanthropologie für den empirischen Ökonomen von grossem Nutzen sein.

Nach einer Skizzierung der hauptsächlichsten Konzeptionen, die sich für die Analyse von Gruppenentschlüssen und der Beziehung zwischen Individuum und Gruppe als nützlich erwiesen haben, wird die These aufgestellt, dass eine wirklich empirische Nationalökonomie von allem Anfang an als ein wesentlicher Teil einer Wissenschaft vom Menschen und der Kultur begriffen werden muss. Eine solche

«Humanisierung» der Nationalökonomie hätte zur Aufgabe, den Menschen – so wie er in Wirklichkeit ist – in den Mittelpunkt der ökonomischen Analyse zu stellen, und würde gleichzeitig den Ausgangspunkt darstellen für die Lösung der dringenden Aufgabe, unser gegenwärtiges Wissen über den Menschen und die Kultur zu integrieren.

RÉSUMÉ

L'économie politique et les sciences du comportement humain. Tant que l'économie politique sera conçue comme une science purement formelle de l'action humaine (praxéologie), les concepts fondamentaux et les découvertes des sciences du comportement humain telles que la psychologie, la sociologie et l'anthropologie culturelle seront considérés comme de peu d'importance pour l'analyse économique. Cependant, si l'économie politique est considérée comme une science effectivement empirique qui part des besoins humains réels et place la dépendance de l'homme de son ambiance naturelle et sociale ainsi que l'action réciproque de cette dernière au centre de ses recherches, les conceptions et conclusions fondamentales des sciences du comportement humain ne peuvent être négligées.

La question se pose alors de savoir par quelle méthode les résultats d'un domaine de recherche peuvent être utilisés dans l'autre. Une telle intégration n'est possible que si nous trouvons ou formulons pour les différentes conceptions des dénominateurs communs suffisamment larges pour contenir l'objet des diverses sciences sociales. Quelles sont les conceptions pouvant se révéler utiles pour une science réellement empirique, voilà qui dépend de la nature des problèmes majeurs de recherches de l'analyse économique actuelle. Comme toutes ces questions fondamentales de l'économie politique moderne se rapportent au comportement de groupes sociaux et de particuliers agissant en tant que membres d'entités sociales d'une structure déterminée, les conceptions fondamentales et les découvertes de la psychologie sociale et de l'anthropologie culturelle devraient être d'une grande utilité pour l'économiste empirique.

Après avoir esquissé les principales conceptions qui se sont révélées utiles à l'analyse des décisions de groupes et des rapports entre l'individu et le groupe, l'article se termine par l'énoncé de la thèse qu'une économie politique réellement empirique doit être conçue dès l'abord comme part intégrante d'une science de l'homme et de la culture. Une telle «humanisation» de l'économie politique aurait pour tâche de placer l'homme – tel qu'il est en réalité – au centre de l'analyse économique et représenterait simultanément le point de départ de la solution de la tâche urgente consistant à intégrer notre connaissance actuelle de l'homme et de la culture.

LIMITATIONAL FACTORS IN POPULATION THEORY: A NOTE*

"So poverty is obsolete and hunger is abolished."
W. S. GILBERT in *Utopia, Limited.*

In recent years there have appeared a variety of studies which, taken together, suggest that the supply of food potentially available to the world is much greater, much more elastic, than formerly was supposed. These studies, it is alleged, have finally laid the supposedly already many times laid ghost of Malthus. For example, the publishers of M. K. BENNETT's excellent *The World's Food* describe it, in the words of a *New York Times's* book-reviewer, as a "dissection of the ghost of Malthus, and of living revivalists of the Malthusian doctrine". This note is concerned with the validity of such interpretations.

I

The argument of the "dissectors" appears to run as follows. (1) Should the food supply become sufficiently elastic in response to inputs of labor and associated agents of production themselves in elastic supply, Malthus's principal line of argument would be deprived of virtually all such empirical validity as it once may have possessed. (2) From (1) it tends to be inferred that, supposing the food supply to be thus highly elastic, man need no longer be apprehensive lest continuing population growth affect his "welfare" adversely. Our counter-argument will run as follows. (a) On a narrow but somewhat questionable interpretation of Malthus's argument, implication (1) might be allowed. (b) But inference (2) is not allowable.

While our argument is based, for purposes of discussion, upon acceptance of the postulate that the food supply is highly elastic, we do not accept this postulate as a satisfactory empirical description of the state of the food supply in most parts of the present day world. Even in countries where the supply of calories may be described as

* I have had the advantage of critical comments of my colleague, C. B. HOOVER.

highly elastic (within limits), the supply of some food elements (e.g., meat) may not be so elastic. Furthermore, even though one accepted JACOB ROSIN's forecast[1] of an eventual chemistic Eden wherein even preferred meats would be plentiful, one would also have to remain cognizant of presentday realities and of the many obstacles which must be surmounted before this Eden could become an actuality, even in advanced countries.

Our counter-argument takes into account the fact that the scale or structure[2] of living is made up of many elements, or components, of which the genus food is but one. Even though food is in highly elastic supply, divers other components are bound to be in comparatively inelastic supply. The more important of these components operate, because of their comparative scarcity, to deter population growth. They may therefore be called limitational factors. The role played by these factors in population theory is somewhat analogous, therefore, it will be shown, to the role played in agricultural theory by the "minimum factor".

II

It is not absolutely clear to what extent nineteenth-century and early twentieth-century students of the population problem thought in terms of limitational factors, since they did not so express themselves explicitly. Malthus, of course, supposed the growth of population to be dependent upon that of the food supply, though how much weight he actually attached to this factor remains a subject of dispute. Moreover, until the 1920's the importance of the food supply continued to be emphasized by students of population. There is apparent in the analyses of these post-Malthusian writers, however, a diminution in the degree of importance attached to the role of subsistence; and it is

1. See *The Road To Abundance*, New York 1953.

2. We shall use the terms scale and structure interchangeably. Since inequality characterizes the distribution of income, consumables, etc., it is not very useful to conceive of the term scale as representing an amount received and enjoyed by each and all. It is more accurate to think of scale in a structural context, since then some value may be chosen as the parameter representative of the structure or the distribution of the divers individual scales of living characteristic of a population. On this matter see HARVEY LEIBENSTEIN, *A Theory of Economic-Demographic Development*, Princeton 1954, p. 12 ff.

inferrable that they saw the population-limiting role gradually passing, in some parts of the world, from food to other components of the structure of living. For these students observed that in the sphere of European civilization the structure of living was undergoing what they considered to be improvements in quality and increases in quantity with the result that the relative importance of food was declining. It not being our purpose to review the development of population theory in detail, the drift of nineteenth century British thought, which was fairly typical of thought elsewhere, can only be suggested by greatly abridged samples of the views of Malthus and three outstanding writers in the Malthusian tradition.

Because MALTHUS gave expression in his *Essay on the Principle of Population* only to a faulty and imperfectly formulated theory of population, and because he never reconciled all the propositional and empirical statements found in the *Essay*, it is possible to infer either that he put overwhelming emphasis upon the role of food, or that he attached considerable importance to non-food elements. In what must have been for him a more theoretical part of the *Essay*, he wrote as if the "means of subsistence"—an increase in which amounted to an increase in the capacity of "the mass of society to command more food"—constituted the factor by whose growth, to the exclusion of the growth of almost all other factors, the growth of population was regulated. For he said:

1. Population is necessarily limited by the means of subsistence.
2. Population invariably increases where the means of subsistence increase, unless prevented by some very powerful and obvious checks.
3. These checks, and the checks which repress the superior power of population, and keep its effects on a level with the means of subsistence, are all resolvable into moral restraint, vice, and misery[3].

The first two of these propositions would have had the support of many who wrote on population in 1750–1798, since in that period, as C. E. STANGELAND concluded, the "doctrine, that population tends to increase more rapidly than the food supply, found almost universal

3. *Essay*, Everyman's Library edition, Bk. I, p. 18/19. Malthus expressed himself less carefully in the first edition; see p. 37/38.

acceptance"[4]. These views may be said to reflect in part the then prevailing pattern of consumption which was founded largely upon materials of organic origin[5].

While Malthus sometimes observed—*e.g.*, on the basis of F. M. Eden's studies—that not much more than two-thirds of the income of a laborer's family would be expended upon provisions, and while he anticipated that the proportion of this income going for provisions might or would decline, he usually looked upon food as the principal limitational factor. Accordingly, if we infer Malthus's meaning from his various statements wherein the importance of food is indicated to be overriding, we may suppose that he considered it the primary population-limiting factor. If however we infer his meaning from other statements, we must diminish somewhat the role allowed food in his theory; but even then it remains very important. He did not, however, express himself explicitly in terms of limitational factors[6].

Less emphasis was placed upon the role of food by the distinghuished late-classical economist, J. S. MILL, in the various editions of his *Principles of Political Economy* (1848–1871). He implied that subsistence would be the sole limiting factor, and that numbers would keep pace with subsistence, only if multiplication proceeded, as among animals, "from a blind instinct". Only "in a very backward state of society" (*e.g.*, Medieval Europe, much of Asia), wherein merely a few enjoyed much more than "actual necessaries", was population "kept down by actual starvation". In "a more improved state" this was not the case; for there the modal scale of living embraced more than "actual necessaries", and many inhabitants were actuated by "prudent or conscientious self-restraint" to limit births. In general, as the condition of mankind rose above that of beasts, population would be "restrained by fear of want rather than by want itself", and the

4. *Pre-Malthusian Doctrines of Population*, New York 1904, p. 353. Some eighteenth-century writers drew attention to limitational factors other than food.

5. "A hundred years ago, nearly 80 per cent of all the things men used were derived from the plant and animal kingdoms... Today only about 30 per cent of the things used in industrialized countries come from things that grow." See K. F. MATHER, *Enough and to Spare*, New York 1944, p. 55.

6. For references to various of Malthu's works wherein the role of food and other factors is treated see my "Malthu's Total Population Theory: A Restatement and Reappraisal", *Canadian Journal of Economics and Political Science*, XI, 1945, p. 87–92, 108–110, 240/41; e.g., see *Essay* Bk. IV, chap. 11.

growth of numbers would be conditioned by a number of circumstances, of which the growth of the food supply would be but one[7]. Mill's approach had been anticipated in part by those French writers who preferred the expression "means of existence" to the expression "means of subsistence".

The economic historian, WILLIAM CUNNINGHAM, wrote in 1883 that "population has generally increased up to the relative limit set by the power of procuring subsistence at any given time and place"; but he added that "sometimes population does not increase so rapidly as the quantity of procurable subsistence is increased". It did not increase so rapidly because the "standard of comfort" characteristic of the population in question had improved qualitatively and increased quantitatively[8].

ALFRED MARSHALL, having reviewed the improvements that had taken place in the British standard of living in the nineteenth century, pointed out, in his discussion of the long-run supply of labor, that the elasticity of supply of labor (*i.e.*, population) depended upon the composition of the standard of living, being greatest when the workers spent their income mainly on necessaries.

> "Thus the question how closely the supply of labour responds to the demand for it, is in a great measure resolved into the question how great a part of the present consumption of the people at large consists of necessaries, strictly so called, for the life and efficiency of young and old; how much consists of conventional necessaries which theoretically could be dispensed with, but practically would be preferred by the majority of the people to some of those things that were really necessary for efficiency; and how much is really superfluous regarded as a means towards production, though of course part of it may be of supreme importance as an end in itself"[9].

Marshall's analysis implied that food was losing its population-limiting power to other components of the structure of living.

7. See *Principles* (Ashley edition), p. 158–160, 348, 371/72.

8. See "On the Statement of the Malthusian Principle", *Macmillan's Magazine*, XLIX, 1883, p. 81–86; *Modern Civilization in Some of its Economic Aspects*, London 1896, p. 173. I am indebted to Professor Thornton Steele for these references.

9. *Principles of Economics*, 8th ed., London 1920, Bk. VI, chap. 2, par. 3, esp. p. 530; also Bk. IV, chaps. 4–5. In his preface, p. xv–xvi, Marshall noted that importations from abroad had temporarily increased the elasticity of the supply of foodstuffs accessible to Britain.

Generalizing, we may say that writers in the Malthusian tradition observed that, in the European sphere of civilization, the scale of life had expanded to include a non-food component appreciably larger than that insisted upon in Malthus's day, and that the habits of the people were becoming adjusted to the maintenance if not to the further expansion of this scale and this component. Had these writers studied more carefully the changes that had taken place in the composition of the net national product, they might have stressed even more the increase in the relative and absolute importance of the non-food component. They did, however, attach less importance than had Malthus to the limitational role played by subsistence. Some writers in the tradition critical of Malthus stressed in even greater measure the decline in the limitational role assignable to food.

III

For the purpose of clarifying the argument to be employed, use will be made of a logistic model. Accordingly, let K represent the asymptotically limiting or maximum population of whose support a given finite environment is capable under prevailing cultural conditions whereunder are included the resident population's aspirations and its methods of production. Let N represent the size of the actual population; b, the maximum rate of increase of which this population is capable in the absence of any environmental resistance to population growth; and R, the realized annual percentage rate of population growth. The logistic model rests upon the supposition that environmental resistance to population growth increases as N approaches K; whence the extent of this resistance may be expressed by N/K. Since the incremental rate of growth is $bN\ (K–N)/K$, R becomes $b\ (K–N)/K$. The value of R thus declines as N approaches K.

If we are content to describe what happens very simply, we may say that, as N/K increases, the logistically-behaving population responds by reducing its rate of growth R. It may do this by increasing its age-specific mortality, or by decreasing its age-specific fertility, or by accomplishing both, so that the direct effects, together with the indirect effects attendant upon the resulting changes in age

composition, produce the indicated decline in R. However, since it is not likely that a population capable of reducing its age-specific fertility would choose to respond by increasing its age-specific mortality, it may be supposed that the population in question would have recourse only to the former alternative. If, however, its fertility-limiting capacity were sufficiently small, it would experience some increase in age-specific mortality.

If a logistically-behaving population responds to a rising N/K by reducing its age-specific fertility, it may do so either because, its minimum acceptable scale of living being fixed, it encounters increasing difficulty providing this standard, or because, its desired scale of living being assumed to rise through time, it finds itself incapable of supplying this rising scale and at the same time maintaining its age-specific fertility intact[10]. The former situation corresponds much more closely to that which Malthus usually had in mind than does the latter. For, while Malthus hoped that a rise in scale would take place and even drew attention to evidence suggesting such a rise, he often reasoned on the supposition of a comparatively fixed scale.

If a logistically-behaving population, whose minimum acceptable scale of living is fixed, responds to a rising N/K by diminishing its age-specific fertility and hence its R, the fall in R is traceable to the fact that, as N/K increases, it becomes increasingly difficult for the population in question to increase the output of the goods and services comprising its structure of living. For as labor and other inputs are increased, their yields at the margin decline and output becomes increasingly inelastic, until finally the yields at the margin are inadequate to permit further population growth and N approximates K. The stationary state of Malthus and the classical economists is then at hand, N having stopped growing because the output of goods and services stopped growing, and this output having

10. Again the term scale is conceived of in a structural sense (see note 2 above). It is assumed, furthermore, that the desired scale is not beyond the reach of the population, given some reduction in age-specific fertility. It is implied, finally, that the elements, the desire for which supposedly may be growing through time, are not offspring, and that the increasing introduction of these elements into the scale of living may operate to displace offspring and so bring about a reduction in age-specific fertility.

stopped growing because (under the conditions given) N stopped growing[11].

Let us designate as O the output of goods and services wherewith the growth of population N is associated in our logistic model. Let us suppose that O is perfectly homogeneous, any one of its components being perfectly substitutable for any other. Let us suppose further, for the sake of expositive convenience, that the structure of living remains unchanged. Then N will increase so long as O increases, subject to the condition that the structure of living remain undiminished by the increase in N. In turn output O will increase as N increases, though not proportionately, ceasing to grow when the growth of N comes to a standstill. Should we define O as food or subsistence, we should have a situation approximating that Malthus had in mind when he supposed the growth of population to be almost solely dependent upon the growth of a food supply which he believed to be subject to diminishing incremental return *[ceteris paribus]*[12].

Malthus's system is defective because the intervening variables have been specified imperfectly or not at all. Again let our logistic model be employed to illustrate the defect. In this model population N has been represented as an essentially linear function of O, and the falling rate of growth R of N has been supposed to reflect the falling rate of growth of O. It is not specified, however, why or how the diminution in the rate of growth of O causes N to behave as it does; nor are the factors which intervene between O and N and condition the response of N to variations in O identified. In the logistic model O has been represented as increasing, though not proportionately, as N increases, presumably because of what N does, directly and indirectly (*e.g.*, work, form capital, etc.). But the variables which intervene between N and O and condition the response of O to in-

11. E.g., see WILLIAM BAUMOL, *Economic Dynamics*, Princeton 1951, chapter 2; A.T. PEACOCK, "Theory of Population and Modern Economic Analysis, I", *Population Studies*, VI, 1952, p. 114–122. The specific value assumed by N turns, in the short-run, on how the output is distributed. The value assignable to K also turns on how output is distributed and used because, *ceteris paribus*, the amount of capital at the disposal of the population depends upon the distribution of income, and the greater is this amount, the higher will be K.

12. Malthus's system permitted improvements in methods of production; but, given these and a corresponding redefinition of the content of *ceteris paribus*, the condition of diminishing incremental return reasserted itself.

creases in N have not been specified. Accordingly, if we give up the restrictions of the logistic model, but remain in ignorance of the roles of what we have called intervening variables, we cannot depect the growth paths of O and N, nor can we define population capacity K.

Our primary concern being with the role of limitational factors, it should be noted that, so long as O is homogeneous, O is the limitational factor, and N's growth is dependent solely upon that of O, the intervening variables remaining as given. Even if O were heterogeneous, but constant in composition, with all of its components growing at the same rate, O would be the limitational factor, or constant complex of limitational components.

IV

It is because O is neither homogeneous nor, if heterogeneous, of constant composition, that it becomes useful for population students to think in terms of limitational or bottle-neck factors, the character of which changes in consequence of changes in technology, structure of living and other cultural manifestations, discoveries, depletion of resources, population magnitudes, etc. Output O is made up of a number of components, O_1, O_2, ..., O_n, few if any of which are perfectly substitutable, one for another. Moreover, these components differ in respect of their elasticity of supply at any particular time, some being relatively augmentable and others relatively non-augmentable. It follows that at all times some components of O may be described as being in a state of potential plenty, whereas others may be described as being in a state of potential if not actual dearth. It is the latter to which the term limitational factor is applicable, for it is their scarcity that is experienced whilst other components remain in plentiful supply, and it is to the impact of their scarcity that population-regulating behavior is ultimately traceable in large measure, particularly since this scarcity tends to be intensified by population growth.

Ultimately, of course, the comparative scarcity and relative non-augmentability of some components of O is to be traced to the comparative scarcity and relative non-augmentability of some (if not all) of the productive agents (or inputs) by which the scarce com-

ponents are produced and of which, in a sense, the scarce components may be said to be composed. The scarcity of the relatively non-augmentable and hence relatively scarce components of *O* is traceable, therefore, to the comparative dearth of those scarce productive inputs which enter into the composition of the scarce components of *O*. While it is possible, therefore, to speak of population-limiting factors at either the production or the use level, it is those at the latter level with which this discussion is concerned; for population-regulating behavior is more immediately traceable to relative scarcity at the use level than to relative scarcity at the production level. So our argument will continue in terms of relatively scarce components of *O* rather than in terms of the inputs of which these relatively scarce components are composed.

What we have called a limitational factor is somewhat analogous to the "minimum factor" of soil theory. Let us call its *optimum* the amount of each plant-food required if we are to obtain a maximum yield of some crop (say corn). Suppose further that each plant-food is present in the soil in an amount falling short of its optimum, with some falling more short than others. Suppose that nitrogen falls relatively most short of its optimum. Then a given small percentage increase in nitrogen will produce a larger percentage increase in yield of the designated crop (*i.e.*, corn) than will a like increase of any other of the plant-foods. Lack of nitrogen may be said, under the circumstances, to be checking the output of corn in greater measure than is the lack of any other of the requisite plant-foods. In like manner, a limitational factor may be said to be deterring population growth in much greater measure than a factor not describable as a limitational factor[13].

The extent to which relatively non-augmentable components of *O* constitute, or are likely to constitute, the population-limiting factor turns on two circumstances. (1) It tends to be greater in proportion as the agents of production (which make up a part of population *N* and of its environment and which produce *O*) are not substitutable, one for another, at the *production* level. (2) It tends to be greater in proportion as the components, or the possible components, of *O* are

13. See W. J. Spillman and Emil Lang, *The Law of Diminishing Returns*, New York 1924, p. ix–xi, 89 ff.; also A. J. Lotka, *Elements of Physical Biology*, Baltimore 1925, p. 211–213, 222 ff., 292.

not substitutable, one for another, at the *consumption or use* level. If agents of production are highly substitutable at the production level, a relatively decline in the availability of some is easily overcome by increasing the availability of others. If components of O are highly substitutable at the consumption level, a relative decline in the availability of some components of O occassions little more than a shift to other components which are (or can easily be made) more available. Given both forms of substitutability in a high degree, a population may continue to enjoy, despite persisting population growth, a structure of living which, though its composition may change somewhat, is deemed as preferable as the structure which formerly was enjoyed. If, on the contrary, with neither type of substitutability highly developed, continuing population growth entails increases in the input cost of producing important components of O (say O_1, O_2, and O_3), a larger fraction of the society's inputs must be devoted to maintaining the output of these components at something like a constant per capita level, with the result that the per capita output of other components must fall in the absence of technological and similar improvements. It is to this fall that the population responds by reducing R, given that its pattern of tastes and values remains essentially unchanged. The limitational factors prompting the response are components O_1, O_2, and O_3, even though the per capita rate of their consumption may remain substantially unchanged whereas that of some other components drops off[14].

Should *ex hypothesi* population grow at the same rate as the more augmentable components of O, even though it was the relatively non-augmentable components for which the population had preference, the structure of living would decline. For per capita consumption of the preferred, relatively non-augmentable components would de-

14. This argument is easily adapted to a dynamic situation in which methods of production continually improve and the structure of living rises in the sense that more and more units of input are consumed per capita. If, for example, we suppose that the desired scale of living increases in quantity though temporarily retaining its proportional composition, an increase in the comparative cost of O_1, O_2, and O_3 would produce a change in the proportional composition of the scale though not necessarily a diminution in the per capita rate of consumption. These comparatively costly components would therefore become limitational factors or (assuming aggregate output had increased sufficiently) potentially limitational factors.

cline, and this decline would not be offset by the fact that per capita consumption of the relatively augmentable components had remainded constant or even had risen. To illustrate. Suppose that food was relatively augmentable and that non-food was not. If population kept pace with an increasing food supply, non-food consumption per head would fall, and the structure of living would be affected adversily. Of course, if the population adjusted its numbers to the environmental situation in which it found itself, its numbers would be governed by the movement of the non-food component rather than by that of the food component, with the result that the outcome, if adverse at all, would be much less adverse than on the preceding supposition[15].

V

It is not easy, short of detailed study of changes in the price structure, in the composition of national product, and in the make-up of living budgets, to identify empirically, even under fairly static conditions, what currently are, or are most likely to be, population-limiting factors. Identification is made more difficult by the fact that what may be the limitational factors for some of the distinct groups composing a population may not be limitational for other groups, and that, therefore, aggregation of findings for particular groups into one for an entire population may involve considerable arbitrary judgment. In general, the limitational factor should be found among those components of the set of living budgets, or of the gross or net national product, which are relatively important and whose costs and prices have been significantly rising relatively to the costs and prices of other components; for it is probably these components, the keeping of whose output abreast with population growth will prove relatively most difficult.

To illustrate what has been said. Let us represent the real cost (*i.e.*, cost in terms of input) and the price (which supposedly corresponds to real cost) of three important components of O, as of the

15. Elsewhere I try to deal with the concept of an optimum population in terms of modern welfare economics, and to indicate that over the longer run human societies tend strongly toward overpopulation (in welfare terms). See "Welfare Economics and the Problem of Overpopulation", *Scientia*, 1954.

base and three later years, together with the magnitude of the population N which supposedly is increasing. On the supposition that the indices of O_4—O_n behave approximately as O_1, which is not a limitational factor in the present context, the limitational factors are O_2 and O_3, with sometimes one and sometimes the other ascendant.

Year	Population N	Index of real cost		
		O_1	O_2	O_3
0	100	100	100	100
5	105	100	102	104
10	108	100	105	105
15	110	100	110	106

If O_2 bulked less importantly in living budgets, or in national product, than did O_3, the scarcity of the latter might be a greater deterrent to population growth than that of the former.

It is to the movement of real costs and prices that one must turn for information rather than to the movement of outputs. It is conceivable, for example, that in year 15 consumption per capita of O_2 remains nearly where it was in year 0, whereas the per capita consumption of some other components has fallen. Given that tastes have remainded substantially unchanged, it is evident that the growth of population, by making the production of O_2 more costly, has caused inputs to be diverted in such amount to the production of O_2 from the production of other components that the diminution in the structure of living is immediately reflected in the reduced per capita consumption of these components, though its origin is to be found in the rising cost of O_2.

While food (or components of the genus food) may be a limitational factor, it often is not. Food is the preponderating component of living budgets in may parts of the world, but it never is the sole component. According to C. C. Zimmerman it is seldom that "any important part of the masses of the population devote more than 75

per cent of its total economic energy to the satisfaction of food values". He puts the minimum fraction at 25 per cent, though it now seems possible that this fraction may fall as low as 10 per cent in technologically very advanced societies characterized by very high per capita incomes and very low population/wealth ratios. Most peoples fall within a range lying between 35 and 65 per cent[16].

Although it does not appear necessarily to follow that the population-limiting character of food is highly and positively correlated with the proportion of a population's efforts devoted to the supply of food, this association commonly obtains empirically. As a rule, if not always, the supply of food currently consumed appears to be relatively elastic in countries whose populations devote relatively little effort to food production, and to be comparatively inelastic in countries whose populations devote relatively much effort to food production. While this difference in elasticity is traceable in part to differences in culture and technology, it is also traceable in considerable measure to differences in man/land and man/wealth ratios. It may be concluded, therefore, that food is very likely to be one of the components making up the complex of population-limiting components operative in countries wherein relatively much effort is given to food production.

This conclusion is also borne out by the fact that, even when intercountry differences in per capita food consumption by weight or calorie content are not great, intercountry differences in diet-composition may be great, with the diets found in countries devoting relatively little energy to the supply of food requiring *(ceteris paribus)* for their production two or three times as many units of input as are required in the production of the diets found in countries devoting relatively much energy to the supply of food. Accordingly, countries in the former category can greatly increase their supply of calories

16. See C. C. ZIMMERMAN, *Consumption and Standards of Living*, New York 1936, p. 59–61; and on sources, FAITH M. WILLIAMS and C. C. ZIMMERMAN, *Studies of Family Living in the United States and other Countries: An Analysis of Material and Method*, U. S. D. A. Miscellaneous Publication No. 223, Washington 1935. On production possibilities see T. W. SCHULTZ, *Economic Organization of Agriculture*, New York 1953, chaps. 7–8, and M. K. BENNETT, *The World's Food*, New York 1954, *passim*. In the United States in 1950 agricultural raw materials comprised, in value terms, about 8,2 per cent of the gross national product, and about 9,8 per cent of the net national product. Distribution costs are not included in these figures.

and nutrients by introducing diets more economical of inputs as well as by diverting more units of input into agriculture[17].

It seems to be inferrable that food (considered generically) is not very likely to constitute the limitational factor in countries where per capita real income is relatively high, animal products furnish a considerable fraction of the calorie intake, and the non-food component of output and consumption per head is relatively high. In countries where an opposite set of conditions is met, food probably is one of the elements composing the complex of components by which population growth is limited. At the same time it is possible that an important preferred species (say meat) of the genus food may be operating as a limitational factor. This might be the case if the demand for the species in question were quite inelastic and quantitatively important whilst (as a result of the population growth) its supply price was moving upward relatively to the prices of other budgetary items.

It is not likely, and price movements do not suggest, that in the aggregate goods and services made up predominantly of labor inputs constitute limitational factors, assuming the scale of living to be given. For the capacity to produce such goods and services tends to keep pace with population growth, except in the instance of types which consist (in addition to labor inputs) of other kinds of input whose relative scarcity tends to increase appreciably as population grows.

It is probable that raw materials[18]—in particular, minerals, and possibly also some of those of agricultural as well as those of forestry origin—presently constitute limitational factors, and that they will increasingly constitute limitational factors if both population and per capita consumption of raw materials increase. For since some of these materials are derived from nonrenewable sources whilst others are produced under conditions of rising costs, it is probable that their costs and prices will rise relatively to the costs and prices of other goods and services. If this be the case then, given the structure of

17. See SCHULTZ, *op. cit.*, Part I; also my "Aspects of the Economics of Population Growth", *Southern Economic Journal*, XIV, 1948, p. 233 ff.

18. For comparative accounts of raw material situations see *Resources for Freedom*, A Report to the President by The President's Materials Policy Commission, Washington 1952; and E. A. ACKERMAN, *Japan's Natural Resources*, Chicago 1953.

living and methods of production, per capita consumption of various other goods and services will be reduced. If, though this be the case, the structure of living undergoes change and methods of production are improved, per capita consumption of goods and services in general will rise even in the face of population growth, but it will rise less than it would have had numbers not increased.

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SUMMARY

It is now sometimes being said that the food supply is becoming so elastic that men need no longer be apprehensive lest population growth affect their welfare adversely. This assertion respecting the elasticity of the food supply lacks empirical validity so far as most parts of the world are concerned. It is true, however, that in some countries food is no longer the operative population-limiting factor, and food may cease to be such in yet other countries. It does not follow, however, that population-limiting factors will cease to be operative. The dynamics of culture, production, and consumption serve to change the character of these factors, but they do not remove them. For if one factor ceases to be operative, its place is necessarily taken by others. Population growth may not affect adversely man's consumption of food or some other item of living supposedly in highly elastic supply; but then it is quite likely, in many empirical situations, to make his consumption of some other items of living lower than it otherwise would have been.

ZUSAMMENFASSUNG

Beschränkende Faktoren in der Bevölkerungstheorie. Es wird heute bisweilen gesagt, das Nahrungsmittelangebot sei im Begriffe so elastisch zu werden, dass die Menschheit nicht mehr befürchten müsse, ihr Wohlstand werde durch das Wachstum der Bevölkerung beeinträchtigt. Die Behauptung hinsichtlich der Elastizität des Nahrungsmittelangebots entbehrt jedoch der empirischen Gültigkeit mit Bezug auf den Grossteil der Erde. Es ist allerdings richtig, dass in einigen Ländern die Nahrungsmittel das Bevölkerungswachstum nicht mehr wirksam beschränken, und dies mag künftig auch in andern Ländern der Fall sein. Daraus folgt jedoch nicht, dass überhaupt keine solch beschränkenden Faktoren mehr wirksam sind. Die Dynamik der Zivilisation, der Produktion und des Konsums tragen dazu bei, den Charakter dieser Faktoren zu ändern, aber sie beseitigen sie nicht. Denn sobald ein Faktor nicht mehr wirksam ist, treten notwendigerweise andere an seine Stelle. Es mag sein, dass der individuelle Verbrauch an Nahrungsmitteln

oder irgendeines andern Artikels mit vermutlich sehr elastischem Angebot durch eine wachsende Bevölkerung keine Beeinträchtigung erfährt; aber dann ist es in manchen konkreten Situationen wahrscheinlich, dass der Verbrauch anderer Artikel geringer sein wird als er es sonst wäre.

RÉSUMÉ

Facteurs limitatifs dans la théorie de la population. Certains prétendent aujourd'hui que l'offre des denrées alimentaires serait en voie de devenir si élastique que les hommes n'auraient plus à craindre que l'accroissement de la population ne porte préjudice à leur bien-être. Cette affirmation sur l'élasticité de l'offre de nourriture manque de toute justification empirique, tout au moins en ce qui concerne la plus grande partie de la terre. Il est cependant exact que dans certains pays la nourriture n'est plus un facteur limitant en fait l'accroissement de la population et il pourrait en être de même à l'avenir dans d'autres pays. Il ne s'ensuit pas toutefois que les facteurs limitatifs cesseront d'agir. L'évolution de la civilisation, celle de la production et de la consommation contribuent à modifier le caractère de ces facteurs, mais elles ne les éliminent pas, car aussitôt qu'un facteur n'agit plus, d'autres se substituent nécessairement à lui. L'accroissement de la population peut ne pas affecter la consommation individuelle de denrées alimentaires ou tout autre bien de consommation dont l'offre est présumée très élastique; mais il est alors probable que dans maintes situations concrètes la consommation d'autres biens sera plus faible que ce ne serait autrement le cas.

TOWARD A GENERAL DEFINITION OF RATIONAL ACTION[1]

INTRODUCTION

One of the most prominent developments in current economic analysis is the renewed interest in the principles of "rational" behavior and choice. And the new interest has a focus somewhat different from that of the traditional point of view. Historically, modern economic analysis began with the *assumption* that human beings do behave "rationally"—whether as producers, traders, gamblers, or consumers—and proceeded to deduce and analyze the consequences of this assumed universal mode of action. The theories of the firm and of the consumer, for example, were regarded as *descriptive* of actual behavior, at least in the sense of being a good first approximation, and were used primarily as instruments in the study of the more complicated social phenomena. Economists, both the neo-classicists and their critics, the institutionalists, spent comparatively little thought on the problem of analyzing just what "rationality" means; they merely defined it as the maximization of a fully known utility function or profit function, and proceeded on to the more "interesting" questions.

Modern economic analysis has at the present time by no means fully abandoned this approach to "rationality"; but there has occurred a strong shift of emphasis toward a *normative* approach. It is being more and more widely recognized that in this complex world of ours it is not as easy to behave "rationally" as was formerly assumed, that businessmen as a group are far from knowing the secret, and that economists might make an important contribution by telling the men of affairs *how* to conduct their affairs rationally—after, of course, first figuring it out themselves. Concurrently with this shift in point of view among economists, workers in other fields of study are beginning to pay an increasing amount of attention to the problem of rationality of behavior, usually when confronted with a situation in which they

1. The author wishes to acknowledge gratefully the valuable help and advice rendered by his colleagues Professors WILLIAM HALLER, JR., JAMES B. LUDTKE, CLARENCE SHUTE, and, especially, JEROME ROTHENBERG. Of course, responsibility for the faults remaining in this article rests solely with the author.

themselves are required to act rationally. The following list, a very incomplete one, indicates some of the fields of study in which the problem of rationality, in various guises, is currently very important. (The reference in each case is to a single one of the leading works in this field.)

The theory of the firm: Many economists today are engaged in the process of enlarging the theory of the firm to include not only considerations of current profit but also of future profits, composition of assets, financial strength and liquidity, public policy, flexibility, safety, peace of mind of stockholders, and many others. Several economists are under the impression that this is an effort at better *description* of the behavior of firms, but, while this may often be true, it also has great *prescriptive* importance[2].

Programming: Programming is concerned with the efficient, or rational, scheduling and planning of *interdependent* activities. Under the leadership of the Cowles Commission for Research in Economics a great deal of work is being done, much of it with government support, in developing procedures for the rational conduct of complex economic, military, and government affairs[3].

Operations research is a somewhat more general concept than programming. First intensively developed during the second world war, it applies probability theory and other analytical methods to the rational solution of practical problems[4]. Its current applications are primarily, but not exclusively, in the various types of engineering.

The theory of games: This, the most dramatic of the recent innovations in the theory of rational behavior, treats of situations in which an "actor" has to contend with opponents or, more generally, with uncertainty in given situations. The principles of the theory are today yielding many norms of action in economics, politics, military strategy, and even in such fields as statistics. The theory of games is currently probably the most intensively cultivated field in the study of rationality[5].

2. See K. E. Boulding: *A Reconstruction of Economics*, (New York: Wiley, 1950).

3. See *Activity Analysis of Production and Allocation*, edited by Tjalling C. Koopmans (Cowles Commission Monograph 13, New York: Wiley, 1951).

4. See P. M. Morse and G. E. Kimball: *Methods of Operations Research*, (Cambridge: Technology Press and Wiley, 1951).

5. See J. von Neumann's and O. Morgenstern's: *Theory of Games and Economic Behavior*, 2nd Ed., (Princeton: Princeton University Press, 1947).

Statistical inference: Statisticians have long faced the difficult problem of estimating unknown probability distributions from relatively scanty observations. It is a problem of choice from among a set of possible probability distributions, each of the possible choices involving dangers of error. The names of J. Neyman, E. S. Pearson, and A. Wald are most prominently associated with the development of principles of rationality in that choice[6].

The theory of probability: The entire theory of probability can be interpreted as a study of the principles of rational conduct in situations in which a certain definite type of uncertainty exists. This is true for both the mathematical and the philosophical branches of the theory. The origins of the theory are quite venerable (in age, if not in motive), but we see today somewhat of a renaissance in the intensity with which it is being studied[7].

Philosophy. A great deal of modern philosophical analysis studies the problems of rational behavior in various situations. The theory of induction, for example, is concerned with rational scientific conclusions; modern logic looks for "good" definitions of rationality of thought; and a few philosophers study rationality in general[8].

All of the listed approaches to rationality have it in common that they define it rather *narrowly;* they prescribe a course of behavior for only stated (and limited) circumstances, and they usually pay attention to only a few of the consequences of the actions studied. But, on the other hand, they all contain important and useful ideas and concepts[9]. *This article will seek to draw from the best elements of all of these approaches to rationality in an attempt to arrive at a general definition of rationality, one that is applicable in all possible circumstances.*

Somewhat surprisingly, and for reasons that will soon become clear, it is extraordinarily difficult to arrive at such a definition. This

6. See A. WALD: *Statistical Decision Functions,* (New York: Wiley, 1950).

7. See W. FELLER: *An Introduction to Probability Theory and Its Applications,* Vol. 1, (New York: Wiley, 1950). R. CARNAP: *Logical Foundations of Probability,* (Chicago: University of Chicago Press, 1950).

8. For example: F. E. OPPENHEIM: "Rational Choice", *Journal of Philosophy,* Vol. L, 1953, No. 12, June 4, 1953, 341–350. – I. J. GOOD: "Rational Decisions", *Journal of the Royal Statistical Society,* Series B, Vol. XIV (1952), 107–114.

9. It is assumed that the reader has at least a vague familiarity with the various listed approaches to rationality. Because of space limitations they cannot be described or discussed here.

article, as the title connotes, makes no pretense whatever of reaching even a provisionally satisfactory result. The definition that follows should be regarded as no more than a working approximation—a guide to future investigation and research. (At least, it is the author's hope that it will be useful in this way.)

It should be made quite explicit at the very outset what our general orientation shall be. First, to repeat what was stated above, our approach is purely *prescriptive*. The definition should *not* be interpreted as in any way attempting to *describe* the decision procedures that are actually being carried on in the real world today. Second, we shall *assume the existence of an adequate method of scientific induction.* In other words, we shall *not* be concerned with the problems of rationally inducing general laws from a set of available observations. Instead, we shall suppose that the induction problem has been solved in some fashion and go on to the question of how to utilize the knowledge so obtained (together with other knowledge) in the formulation of rational actions of the "applied" type. This is not to assert that the problems of scientific induction and of the rational application of knowledge are in any real sense distinct; it does mean that we believe that a more-or-less artificial separation of the problems does facilitate their analysis. Third, we wish our definition of rationality to be sufficiently general to serve as a guide to action in almost any set of circumstances. For example, we wish it to apply to the situation of a private individual in his personal actions, to the manager of a business firm, to the commander of an armed force, to a government official, to a union leader, or to anyone else at all in a decision-making situation[10].

REQUIREMENTS OF A SATISFACTORY DEFINITION OF RATIONAL ACTION

Let us start our search for a definition by mentioning the *properties* that we wish the definition to have. This involves a specification of

10. We have used the word "rational" quite a bit up until now, with the intention that the reader should understand it in its customary vague sense. From this point on it will be regarded as a technical term whose precise meaning is to be defined.

the "errors" we wish it to avoid, of the "facts of the world" that we wish the definition to take into account, and of the situations we wish it to be able to encompass.

I. Actions to be designated as "non-rational"

First, let us enumerate the types of action that we wish the definition to label as being *non-rational:*

1. *Ignorant action,* which is defined as being action that is decided upon on the basis of either
   (a) mistakes in the facts considered, or
   (b) the omission of available relevant[11] facts.

An example of action based on a mistake in fact is one that assumes that black cats bring bad luck, or that a more northern locality is always colder than a more southern one, or that war inevitably produces inflation. Ignorant action based on the omission of available relevant facts is exemplified by a statesman who adopts a policy without considering the findings of social science bearing upon the consequences of that policy.

2. *Illogical action.* This is defined as action that is based on either
   (a) erroneous deductions or predictions from the facts considered, or
   (b) erroneous application of normative criteria.

Some typical examples of erroneous deductions or predictions are:

1) Simple mistakes in reasoning.
2) The wishful (or fearful) thinking of a strongly motivated person who overreaches the available facts, *i.e.*, who jumps to conclusions that cannot be logically deduced from the available information.
3) The confusion by a reformer or innovator between a *possible* consequence of his plan and a *necessary* consequence. For example, on the basis of available knowledge it is possible that the adoption of "socialized medicine" will increase human wellbeing, but it is by no means proven that this will necessarily follow.

Typical examples of erroneous application of normative criteria are:

11. "Relevance" is given an explicit definition below.

1) The adoption of an action "because it is right", or because of something that happened in the past, without considering its future effects. (It is assumed that future happenings are not a matter of indifference to the "actor".) Many of our penal practices are based on this type of error.
2) The confusions that may accompany the attempted application of unclear or partially self-contradictory criteria. People who seek to promote "the greatest good for the greatest number" are quite familiar with these confusions, as are other people who seek to attain incompatible ends.
3) The failure to consider *all* relevant value criteria.

3. *Blind action* is that action which ignores at least some of the value-affected[12] consequences of the action. It can safely be asserted that most actions of men, in whatever capacity they may be functioning, are blind in this sense. An actor usually confines his attention to a few "intended" consequences of the action and ignores its manifold "unintended" ones. Whenever an act is being judged within a frame of reference that is narrower than the total range of interest of the actor, his action is blind. What is "good" in a narrow context is very often "bad" in a wider one. Typical examples of blind actions are:

1) The abolition of a tariff on strictly economic grounds, without considering the effect on national security, on the sociological values of a diversified industry, on the educational standards of the country, etc.
2) The adoption of a balanced budget policy by a government on grounds of financial prudence, without considering *all* the direct and indirect consequences of the appropriate tax and expenditure policies, economically, sociologically, psychologically, esthetically, morally, medically, etc., both in the present and in the future.
3) Profit-maximization by a firm, where all considerations other than profit are ignored.
4) Food consumption by an individual on the bases of taste and cost alone.

4. *Rash action*, which is defined as being action that is adopted after an incomplete consideration of the various *alternatives* of action that

12. An event is said to be "value-affected", relative to a given "actor", if its occurrence is *not* a matter of indifference to the "actor".

may be present. Commitment to one form of economic organization, for example, without a careful study of the actually existing or possible other forms, is rash. So is, to take another instance, the purchase by a customer of the first item the salesman shows him.

As has been said, we want our definition of rationality to be such that any person acting in accordance with it will not be acting ignorantly, illogically, blindly, or rashly. It seems quite reasonable, at least to the author, to make this one of the basic requirements of "rationality".

II. Important facts to be considered

Next, let us look at a number of important characteristics of the world in which we live and act that must be taken into account by our definition. It is the following facts, primarily, that make the problem of satisfactorily defining rationality so very difficult and complicated. Every existing definition of rationality known to the author ignores at least some of these facts[13].

1. *Action, in general, is not a "one-shot" affair but rather stretches over time.* We should really speak of *courses of action*, not of actions[14]. Accordingly, we want our definition of rationality to be able to specify the correct courses of action over time.

2. *The effects of an action radiate out in many directions*, and infringe upon an enormous number of value-affected and other aspects of the world. It is quite possible that a given action will affect, directly or indirectly, every variable of the world discernible to the actor. Of course, a great many of these influences will be quite small, but nonetheless they will be present. And, since the number of possible variables that can be discerned in the world is infinite, it may be said that an action may have an infinite number of consequences.

3. The results of an action not only involve a huge number of variables but *affect these variables over a period of time.* Strictly speaking, the effects of an action stretch from the moment the action is inaugurated on to *infinity.* Even a simple action like the adoption of a given

13. None of these points will be *proven* to be true here. Most of them are well-known. As for the others, the reader probably will, after a little reflection, be willing to accept them as true and valid.

14. But we shall (as a short-cut device) continue to use the word "action".

strategy in a game of chess has effects that extend past the end of the game to infinity and that may well be of far greater importance than the outcome of the game[15]. The same holds true for all other actions even though they may have only limited intended objectives and only immediate visible outcomes.

4. *The state of information of the "actor" must inevitably be taken into account* in determining what is rational for him. For an omniscient being the problem of rational behavior is much easier than for a mere human. The human being, always being in partial ignorance of the world around him, can not do anything better than just to get the most out of the information he has or can obtain. What is a warranted action in accordance with a given body of information, may be a quite foolish one when more, of different, information is available. We want our definition to take cognizance of the ever-present deficiency of knowledge of human beings, and of the inevitable relation between information and rationality. We have reference here to two types of information, both having to do with the characteristics of the world in which we do our acting:

(a) that pertaining to the number and character of the alternatives of action and

(b) that pertaining to the multitudinous effects of each of the various alternatives.

Ordinarily the state of information of an actor will be far short of completeness in *both* respects.

5. *The accumulation of further information is difficult and costly.* This cost must be taken into account, because it may often be the case that it is "not worth it" to collect further information before acting. The process of information-gathering is a potentially endless one, and its cost therefore tends to infinity. Also, the process takes time, and action frequently cannot wait. The world does not stand still while the actor makes up his mind. It is therefore not usually a good idea to seek an absolute maximum of information before deciding upon a course of action, but to settle for some lesser amount. The definition of rationality should recognize this point.

15. As an example the reader need think only of a game in which the opponent is one's boss, or one's spouse.

6. *The outcome of an action is, in general, not controllable by the actor*[16]. The outcome of a given action may be visualized as being a function of two variables: (a) the action itself, and (b) the behavior of the rest of the universe. Since the actor can control only (a), and since (b) is only incompletely known and poorly predictable by him, the result of the joint action of both these variables cannot be known to the actor with any degree of assurance. In other words, the actor, at the time he chooses an action, does so without controlling, or even knowing, its outcome.

There are basically *three* levels of the uncertainty of an actor with respect to the outcome of his actions.

1) He may be able to discover the set of possible values of (b), and thereby the set of all the possible outcomes of his action. Further, he may also be able to discover the *probabilities* of the various possible outcomes.
2) He may be able to discover the set of all possible outcomes, but not the respective probabilities.
3) He may not even know the various possible outcomes of his action. (Except, perhaps, that "anything might happen".)

The definition of rationality should be able to cope with any of these levels of uncertainty on the part of the actor.

7. *The value criteria of different actors differ.* It is a commonplace that there exists a tremendous diversity in the value criteria—the motives, tastes, goals, opinions, and esthetic and moral ideas—by means of which different individuals appraise the various outcomes of their possible actions. We want our definition of rationality to be able to specify a "correct" course of action for *any* set of value criteria, *i.e.*, to be usable by *all* actors to maximize the satisfaction of their "tastes", *whatever these may be.* We want this to be true for actors who subscribe to inconsistent criteria or who are motivated by unconscious drives as well as for those who behave in a more calculating fashion.

8. *The value criteria of a given actor tend to change over time.* An action which is "satisfactory" at the time it is first adopted may therefore become quite "unsatisfactory" as the tastes and ideas of the actor

16. The "outcome" of an action here means the entire set of effects of the action.

change. The available evidence indicates that such changes are often the normal rather than the exceptional thing, and our definition of rationality must therefore be sufficiently flexible to take these possibilities into account[17].

9. One of the main reasons why the value criteria of individuals change so often is that *a person's memories of the past and expectations of the future influence the criteria with which he judges the world today*. And, since both memories and expectations are constantly changing, the value criteria through which presently-available alternatives are evaluated change as well.

10. In view of points 2., 3., and 8. above, *the process of judging the outcome of a given action may potentially be infinitely long*. We must consider a possibly infinite number of variables, over a possibly infinite stretch of time, in the light of a possibly infinite diversity of value criteria. (Obviously this is a rather difficult situation to contend with, and the definition of rationality should therefore contain a stop-rule for the process of judging.)

11. The difficulty of potential infinity is even aggravated by the fact that *there may be an infinity of possible actions among which an actor has to choose*. (This may, at first, be a startling assertion, but the reader will probably see the truth of it if he tries to enumerate merely all the physical movements he can make in the next month[18].) As was seen above, each of the possibly infinite number of actions should be judged by a possibly infinitely long process.

12. *The process of judging the various possible actions—of making all the required calculations and logical deductions—is difficult, time-consuming, and costly*. Also, the actor may have value criteria bearing upon the various types of calculation. And further, during the time the judging takes

17. For example, we want it be "irrational" to take an action that, even while being "satisfactory" today, may make it impossible for us to satisfy the value criteria we may have tomorrow. To take a simple example, assume an actor is quite fond of milk today. He should not commit himself to large future purchases of milk if it is possible that his tastes may shift to beer tomorrow.

18. As a matter of fact, there is a non-denumerably infinite number of ways in which the reader can put down this journal.

place the world does not stand still. The definition of rationality must fully consider these inevitable facts.

13. *The actor usually has value criteria bearing upon the necessity of choosing an action without having complete knowledge of the various possibilities of action and their outcomes.* He may dislike acting on very little information because it is "foolhardy", or "dangerous", or "morally wrong"; or, on the other hand, he may like it because it is "thrilling" or "comfortable" or "easy". Such criteria are equally important with the ones mentioned under 7. above, and should therefore be considered fully. (The insurance principle and the pleasures of gambling are involved here.)

The ideal definition of rational action—one which we will not be able to formulate satisfactorily here—would specify how, in view of the 13 points just mentioned, we can adopt a course of action without committing one or more of the four irrationalities discussed before.

TERMINOLOGY

Before proceeding further, it is necessary for us to develop a somewhat more precise terminology than we have been using up until now. Here, like in so many other instances, clarity of concept is indispensible for clarity of thought[19].

Variable: A variable is anything whatsoever that continues through time and that assumes, at each instant of time, one of the set of mutually exclusive values[20] in its characteristic range of variation. (One of these values will usually be "zero", "none", or some equivalent.) We place no limitation at all on the type of entity that can be considered to be a variable other than that it must have the defining properties. It may in fact vary, or it may remain constant; it may take on quantitative or qualitative values; it may vary over a continuum or it may have a denumerable or finite number of values; and it may be directly observable or not. If an object has two or more

19. We shall assign a technical meaning to a number of familiar terms, and the technical meaning may diverge a little from the familiar meaning. I hope that no undue confusion will result.

20. It is hoped that our double use of the word "value", as a point in the range of variation of a variable and as an axiological entity, will not prove confusing. The context will indicate what meaning is intended.

ranges of variation that interest us, it is considered to constitute as many variables as it has such ranges of variation. A given person, for example, might be regarded as being the following six variables: John Doe (weight), John Doe (age), John Doe (religion), John Doe (social status), John Doe (wealth), and John Doe (occupation).

Value-affected variable: This is a variable whose behavior is not a matter of indifference to a given actor. It is one to which at least one of the value-criteria of the actor refer[20], *or* one describing the value-criteria themselves.

World: The world is the infinite set of variables that we can perceive or conceive of. In other words, it is the raw material in which we can discern as many variables as we choose and study their behavior. It is the inexhaustible "grab-bag" of variables and their values that constitute all our experiences.

System: Any set whatsoever of jointly-considered variables, including the "world" or any lesser set, is a system. For the purpose of this paper, we shall always regard *time* to be one of the variables of a system.

Value-set: This is the set of all value-affected variables of a given actor.

State of a system: A state is any logically possible combination of values of the variables of the system. In an n-variable system, a state is always a set of n values, one value of each of the n variables.

History of a system: This is one of our key concepts, and a somewhat tricky one. It denotes a set of states of the system such that there is one state, and one only, for each point of time (in the time interval considered). It is, in other words, a time-sequence of states stretching over any given finite or infinite period of time. *Any* logically possible sequence of this sort shall be called a history of the system.

A priori range of a system: The entire set of logically possible histories of a system shall be called the *a priori* range of that system[21]. It is the

21. Consider, for example, a system of 4 variables: A, B, C, and time. Assume that A can assume 10 values, B 3 values, C 5 values, and time 100 values. At each point in time this system can assume one of $10 \times 3 \times 5$ or 150 different states. Since there are 100 points of time to be considered, the system has 150^{100} possible histories. (Of course, if any of the variables had an infinite number of possible values, the number of histories also would have been infinite.) That set of 150^{100} histories is the *a priori* range of the system.

totality of different courses of events that could conceivably transpire in the system.

Event: An event is the alternation of a set of histories that have some property in common[22]. That property may be a given value at a given moment of one of the variables of the system, a certain relation among some of the variables, an equal degree of satisfactoriness, or anything else at all. Each single history is an event, as is the alternation of all histories in the *a priori* range of the system, and as is any other set of histories.

Information: Information, in relation to a given system, is knowledge concerning the behavior of the variables that constitute the system. An item of knowledge is information in this sense if, and only if,

(a) it is *valid*, *i.e.*, established as being true. We are assuming now that we have available appropriate methods for distinguishing between true and false propositions, and that, in general, our methodology of science is capable of coping with questions of this sort. A proposition whose validity is neither established nor disproven is *not* information;

(b) it assigns probabilities[23] to at least one event of the system. It may declare an event to be impossible (probability of zero), or to be necessary (probability of one), or to be probable in some intermediate way;

(c) its validity conditions are fully stated, *i.e.*, it holds true, as it stands, under all possible surrounding circumstances. There should be no unstated validity conditions a change in which could, without previous notice, make the statement untrue. (But reasonable allowance should be made here for the "finitude" of the human mind in conceiving of validity conditions.)

Information consists of definitional identities and of synthetic propositions; and synthetic propositions, in turn, consist of observations, static laws, and dynamic laws.

Space of a system: The space of a system, relative to a given body of information, is what becomes of the *a priori* range of the system

22. An alternation of a set of histories is described by the proposition that one of these histories is the "true" one. It is the proposition in which the various histories are joined by the logical connective "or".

23. "Probability" should here be understood in the sense of a *relative frequency*.

after the information is applied to it. It is the set of all possible histories *together with* the known probabilities of the various histories and events. A typical space will contain histories with each of the following types of probability:

(a) Many histories will have a probability of zero; they are unconditionally "ruled out" by the available information.

(b) Others will have definite non-zero probabilities—those concerning which we have explicit information.

(c) For many we will know a *range* of possible probability but not the specific probability. These may be the histories that are component parts of events of which we do know the probability. Assume, for example, that we know a certain event, consisting of n histories, to have a probability of p. Then, in the absence of further relevant information, each of the n histories can have a probability between zero and p. Other histories, not part of such events, and concerning which we have no explicit information, can have probabilities between (zero) and (1 – the sum of the known probabilities of other events). In all cases the probability of an event equals the *sum* of the probabilities of the component histories.

In the case of a system for which the available information is of the "yes-or-no" rather than of the probability type, the space will consist of histories with either zero or entirely unknown probability.

Action: An action of a given actor is a course of behavior of that actor which specifies, for each moment of time, a fixed mode of response to the information available at that time, whatever that information may be[24]. It prescribes his pattern of response, over time, to the unfolding flux of events, insofar as it is known to him.

Not all actions will *explicitly* prescribe a mode of behavior for all conceivable contingiencies. Some "degenerate" types of action are:

(a) A pre-determined course of behavior that will ignore new information entirely and proceed rigidly according to a preconceived fixed plan.

(b) An action in which the mode of response to some contingencies is unstated; *i.e.*, left to hunch or to chance (with unspecified probabilities).

24. It is analogous to what von Neumann and Morgenstern call a "strategy".

An action specifies, among the other kinds of behavior, when and to what extent the actor will engage in additional *information-gathering*, with respect to both

(a) additional possible actions, and

(b) the behavior of the rest of the universe.

It also specifies when and how a system under consideration is to be enlarged by the addition of new variables, usually in order to be able to "digest" new information.

Outcome of an action: The outcome of an action, relative to a given system, is what becomes of the space of that system when the action is assumed to be adopted. (In practice the outcome of an action will never be known to within a single non-zero-probable history.)

THE DEFINITION OF RATIONAL ACTION

We are now ready to formulate our tentative general definition of rational action. *We shall do so by describing a "rational" procedure for selecting an action from among the set of all possible actions.* Because of the complexity of the problem we shall proceed in two steps: first by making a few unrealistic assumptions and then by removing them.

Step 1:

Assume that:

(a) we are, at the present time, choosing an action once and for all;

(b) there is no cost or effort in calculation and judging, and no value criteria bearing upon the procedures involved;

(c) all calculations can be made now; *i. e.*, calculation is not time-consuming;

(d) the number of possible actions is finite; and

(e) the system to be considered consists of a finite number of variables.

Under these assumptions, the following method of choosing an action is "rational"[25]:

1. Consider a system that contains

(a) the entire value-set;

25. The procedure to be described is illustrated in the appendix to this article.

(b) all other variables that are needed to take account of the available information bearing upon the behavior of the value-set;
(c) time.

2. Applying all the available relevant information, construct the space of the system. This information normally should include knowledge referring to all of the following:
   (a) the behavior of the "outside world";
   (b) the effects of further information-gathering by the actor on the value-set;
   (c) the possible changes in the value-criteria of the actor as a result of his experiences, or any other source.

3. Determine the set of all possible actions.

4. Compute the outcome of *each* of these actions.

5. Judge each of these outcomes, in the following way:
   (a) Evaluate the "satisfactoriness"[26] of *each* non-zero-probable history in the outcome by
      i) evaluating each time-point in that history (using the value-criteria contained in its description to judge the other values of the variables);
      ii) aggregating the "satisfactorinesses" of the various time points to arrive at a "satisfactoriness" of the history as a whole. This aggregation requires the use of a *secondary value-criterion relating to time-preference* in weighting the "satisfactorinesses" of the various time-points. Different actors will, of course, have differing patterns of time preference. The time-preference criterion will ordinarilly set a "horizon", a time-point beyond which all states of the system are weighted at zero.
   (b) Using *another secondary value-criterion*, one pertaining to *risk-taking preferences*, determine the "*significant worth*" of the outcome. The significant worth is that "satisfactoriness" of an outcome that the actor chooses to use in comparing the outcomes of different actions. If the actor is the cautious, con-

26. The reader may think of "satisfactoriness" as a numerical utility. I am avoiding the more familiar term in order not to become involved in the as-yet-not-fully settled controversy on the cardinality of utility.

servative type, he may adopt the minimax risk-taking criterion, and the significant worth of the outcome of a given action is the "satisfactoriness" of the *worst* non-zero-probable history in that outcome. An optimistic gambler may choose the worth of the *best* such history. In some cases, when the probabilities are sufficiently well-known, the significant worth will be the mathematical *expectation* of "satisfactoriness". Other actors may choose to disregard the very improbable histories and minimax the rest, or they may choose to minimax what L. J. Savage calls "regret", or they may adopt any other risk-taking criterion at all. There is no way in which we can say, in general, what risk-taking criterion an actor "should" adopt—that is in most cases purely a matter of taste, as were his criteria in judging the different histories themselves.

6. Adopt the action whose outcome has the greatest significant worth.

Step 2:

Let us now abandon the stated assumptions we have made in Step 1 and attempt to set forth a rational method of choosing an action in general, considering all of the 13 complicating factors previously enumerated.

As might be expected, the main difficulty arises from the beforementioned fact that the process of calculation and judging is potentially infinitely long. Also, it may be desirable from time to time, as more information and evaluations become available, or as the time-preference and risk-taking criteria change[27], to abandon a present action and to adopt another one.

Under these circumstances, the procedure of rational action assumes a somewhat different character than in Step 1. No longer can we do our computations and judging first, decide upon a course of action, and then proceed to carry it out. Now, the calculation and judging and the acting must proceed *concurrently*, and side by side. Furthermore, our decision to adopt an action will always be based on an *incomplete* calculation, and will usually turn out to be "mistaken" as the calculation proceeds.

27. We have, in Step 1, silently assumed the actor's tastes with respect to these two "secondary" criteria to remain constant.

The process of calculation and judging, as has been seen, is potentially infinitely long in *several* directions:

(a) in the number of possible actions to be considered;
(b) in the quantity of information to be used in computing the outcome of a given action;
(c) in the length of the time period for which a given outcome is to be computed;
(d) in the number of value-affected and other variables of the world to be considered;
(e) in the number of different "primary" value criteria that might have to be considered;
(f) in the number of different "secondary" value-criteria—time-preference and risk-taking—that might become relevant.

At any given moment of time, the calculations will inevitably be incomplete with respect to at least the first *four* directions. We shall denote the sum total of all the calculations and judgments made up to a given point of time (and not forgotten) the *inventory of knowledge* at that point. This inventory should be visualized as an ever-increasing one, the rate of increase at any given time being the rate of calculation at that time.

There is another important factor to be considered here: the "cost" of calculation and judging is largely an *opportunity cost*. Since there is a basic limitation on available resources (including time) there exists a relationship of complementarity between action and calculation. The more we calculate, the smaller is the number of possible actions open to us; and the more resource-consumingly we act, the less we can calculate. Similarly, some types of action preclude some types of calculation, and vice versa. The opportunity cost of a given calculation, therefore is the difference between the significant worth[28] of the best action[28] that could have been taken if we did not engage in this calculation and significant worth of the best action[28] available now.

Keeping these various facts in mind, we define the rational procedure for choosing actions to be the following:

1. *At each moment of time [or at periodic intervals]* consider the set of all the possible *combined actions* that are given in the inventory of

28. To the extent known to the actor.

knowledge at that moment, where a combined action is an action as previously defined *plus* a given *rate* and *type* of further calculation and judging.

2. Evaluate *each* combined action in the following way:
   (a) Using only the present inventory of knowledge, and proceeding as in Step 1, determine the significant worth of the outcome of the "regular" part of the combined action.
   (b) Determine the "worth" of the further calculation and judging specified in the combined action. This *cannot* be done by referring to the results of these efforts—the results are by their very nature unknowable, and we cannot have information bearing upon them. Instead, we must have recourse to two further secondary value-criteria,
      i) a *computation criterion*, dealing with the "pain" or "pleasure" of the various types and quantities of calculation and judging, and
      ii) an *uncertainty criterion*, dealing with the "pain" or "pleasure" of acting on the basis of incomplete knowledge.

   Ordinarily, the computation criterion will be such that the "pain" of computation, past a certain point, varies *directly* with the rate of calculation and judging, and *inversely* with the skill of calculation and judging of the actor. (The availability and competence of computing machinery, etc., is reflected in the "skill" of the actor.) As for the uncertainty criterion, there is a wide variety of patterns possible. The typical actor will probably have a "pain" of acting on the basis of incomplete computation that varies *inversely* with both the size of the inventory of knowledge and the significant worth of the outcomes considered so far. The actor's hopes of improving his choice of action by doing additional calculation and judging will normally fade as the amount of calculation already done increases and as the significant worth of the already-considered actions increases.

   In addition, this "pain" will probably vary *directly* with the number of alternative actions in the inventory of knowledge in relation to the amount of computation in that inventory. (Ignorance may be bliss.)

(c) Add (a) and (b) to obtain the combined significant worth of the combined action.

3. Adopt, at the present moment of time, that combined action which has presently the greatest combined significant worth.

4. Repeat the process periodically.

EVALUATION OF THE DEFINITION

It is necessary at this point to ask ourselves whether or not the definition just stated satisfies the requirements we had originally set up for a satisfactory definition of rational action. The reader can verify for himself that it *does* take account of all the various relevant characteristics of the world listed above. But he will also note that a person proceeding in accordance with the definition may quite well commit some of the four acts that we have designated as being non-rational. For example, because of the inevitable incompleteness of the inventory of knowledge, that person will probably be acting blindly and rashly, at least. Does this mean that either our definition or our requirements for the definition are unsatisfactory, or that the two are inconsistent?

The difficulty here arises from the fact that a complete and perfect satisfaction of our stated requirements necessitates, as we have seen, an infinitely long computation process. And the best that can ever be done about an infinitely distant goal is to *proceed in its direction*—it can never actually be attained. Will a person acting in accordance with our definition of rationality approach progressively closer to the perfect rationality? This is a question that is quite difficult to answer with certainty, one way or the other. But intuitively it seems clear that that *will* be the case. Assuming that no information or calculations or judgings are forgotten or otherwise lost, the ever-expanding inventory of knowledge will make possible an ever-continuing correction of error, and thus a progressively closer approach to the satisfaction of our requirements for rationality. It may well be true that our errors are so numerous and so serious that the continuing correction process is only a small thing in relation to the magnitude of the problem, but then even a slow approach to an ideal is nevertheless

an approach. If our requirements for rationality are understood as defining the *ideal*, and our definition as a method of *approaching* the ideal, the inconsistency between the two disappears.

SOME UNSOLVED PROBLEMS

The most serious[29] shortcoming of the present definition is its incompleteness. It presumes to tell a person what he should do in order to be acting rationally, but it does not indicate at all *how* these things can be done. Perhaps, however, this is not really a shortcoming—it was, after all, the main purpose of this tentative definition to suggest areas of useful study. The following list enumerates some of the problems that must be solved before action can become much more rational than it generally is today.

1. We need a method of assigning numbers, preferably cardinal numbers, to the "satisfactoriness" of given histories. The method should be sufficiently flexible to be able to apply *any* set of value criteria to the judgement of *any* history whatever. (The famous problem of the measurability of utility is only a small part of the general problem.)
2. We need a scientific language capable of expressing, in a way suitable for further calculation, all kinds of knowledge.
3. We require an efficient technique of specifying sets of histories and their probabilities. The space of a system may often consist of a several-dimensional continuum of possible histories. We need to develop, as the mathematicians have done, practical methods of dealing with infinity (or, at least, with very large numbers of items).
4. We must discover, if possible, a way of determining in what order the various possible actions should be investigated. The rapidity of our approach to perfect rationality depends on this order.
5. We need to discover a good way of determining the "best" frequency of making the computation described in Step 2 in the formulation of our definition.
6. We need a method of calculating the mathematical expectation of satisfactoriness of an action where some or all of the probabilities

29. Insofar as the author is presently aware.

of the various histories in the outcome of the action are known only to within a range of values.

7. We need methods of determining whether a given variable is of "small" or of "great" importance to a given actor. The problem is that the behavior of a non-value-affected variable can always, in the absence of knowledge to the contrary, have repercussions on other variables that *are* of great concern to the person.

8. We should investigate if it is sometimes "good" to forget or destroy information and computations. Would that make possible additional actions that have a high significant worth?

9. We need to analyze the whole problem of the relation between rational methods of scientific induction and rational ways of using the information so obtained. (An adaptation of the Neyman-Pearson-Wald method would probably be of use here.)

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SIDNEY SCHOEFFLER

APPENDIX

The rational procedure of choosing an action is, as has been seen, a quite complicated one; and for that reason we cannot go into a realistic example of it here. But it might promote a clearer understanding of the concepts involved if we examine a simplified illustration of the process.

Let us consider a grossly simplified system S consisting of five variables: A, B, C, D, and *Time*. Each of these variables can assume only a finite number of values. A can assume 9 values, B 4 values, C 5 values, D 5 values and *Time* 10 values. We shall denote the values of A by

$$a_1, a_2, \ldots, a_i, \ldots, a_9;$$

the values of B by

$$b_1, \ldots, b_j, \ldots, b_4;$$

the values of C by

$$c_1, \ldots, c_k, \ldots, c_5;$$

the values of D by

$$d_1, \ldots, d_l, \ldots, d_5;$$

and the values of *Time* by

$$t_1, \ldots, t_m, \ldots, t_{10}.$$

At each point of time m the system S can assume, as far as we know *a priori*, any one of $9 \times 4 \times 5 \times 5$ or 900 states, the "general" state to be denoted by $(a_i b_j c_k d_l t_m)$.

Since there are 900 possible states of S, and since there are 10 points of time to

be considered at each of which S can assume any one of these 900 states, the *a priori* range of S consists of 900^{10} possible histories. (A history of S, as should be recalled, is a sequence of 10 states of S, one for each point of time.)

We shall take the variable C as being the only one of the system which can be directly manipulated by the actor. An action, therefore, consists of the choice of a sequence of 10 values for C, one value for each point of time. Since at each time point the actor might choose any one of 5 values of C, the total set of possible actions consists, *a priori*, of 5^{10} different actions.

Assume that the actor has available to him the following information pertaining to the behavior of the variables of S:

Static laws: ("Laws of coexistence")

(1)[1] $i = j + k - 1$

(2) $|j - k| \leq 2$

Dynamic laws: ("Laws of succession")

(3) i cannot change by more than 3 between successive time points.

(4) $\sim([k]_m \cdot [(l + 1) \vee (l + 3)]_{m+1})$

(5) At any given point of time the actor is familiar with the course of the system only up to the *preceding* time point.

Observation:

(6) At t_1, the state of the system is $(a_1\ b_1\ c_1\ d_1\ t_1)$.

The variable B, we further assume, describes the *value criteria* by which the actor might judge the various possible states of S. We assume that there are just 4 such criteria:

b_1: the higher the sum of i, k, and l, the "better" the state is;

b_2: the lower the sum of i, k, and l, the "better" the state is;

b_3: the higher the value of i, the better it is;

b_4: the lower the value of k, the better it is.

At any given time point, of course, the actor subscribes to one (and only one) of these criteria. As is true in the real world, he does not consciously and voluntarily choose that criterion; and, as is also true, the behavior of the rest of the world influences his ideals and ideas[2].

In order to keep the present illustrative case as simple as possible, we shall assume the situation of Step 1 of our definition of rationality with the additional assumptions that the volume of information is fixed and that that information, as was seen above, just assigns probabilities of zero to some of the *a priori* possibilities, and no other probabilities. Further, the time-preference value criterion is taken to be unchangeable, and it assigns an *equal* weight to the "satisfactoriness" of each time point. The risk-taking criterion, also unchangeable, is the *minimax* criterion.

The space of the system S should be ascertained in the following way. Taking each of the six items of information in turn, we *eliminate* from the *a priori* range of S

1. The letters i, j, k, l and m are the *indices* of the values of variables A, B, C, D, and *Time*, respectively.

2. In every more realistic case, the actor would hold *several* value criteria simultaneously, some of them perhaps even inconsistent with each other. In such instances we need to find a common denominator for the entire set of evaluations at each moment and to convert that set into a single number. (Obviously, some rather thorny problems are involved here.)

all those histories that are inconsistent with that item. Item (1), for example, by assigning a probability of zero to all the *a priori* possible states of the system that violate the given relation among the variables A, B, and C, justifies the elimination of all those histories of which *at least one* component state violates that relation. Any history containing the state, say, $(a_3\, b_3\, c_2\, d_4\, t_m)$ is now known to be impossible of occurrence (to have a probability of zero) and can therefore be eliminated from further consideration. Item (6), as another example, warrants the elimination of all histories whose first state is different from the given one. The elimination procedure for the other items of information follows the same pattern. After the entire process is completed, and all the histories of zero probability eliminated from the *a priori* range, the remaining set of possible histories of S is the *space* of S.

Inasmuch as we have (by assumption) no further information relevant to S, there is nothing we can say about the probabilities of the various histories remaining in the space of S. All we can say is that any given such history is, as far as we know, "possible" of occurrence. Its "true" probability might be anything from zero to one, inclusive.

Let us now consider the following one of the many actions available to the actor[3]: At each point of time he will choose the value for C which, in the light of the value of B prevailing at the preceding[4] time point, contributes the maximum possible amount to the "satisfactoriness" of the present. Accordingly, if the relevant value criterion is

b_1, he will choose the highest possible k;
b_2, he will choose the lowest possible k;
b_3, he will choose the highest possible k;
b_4, he will choose the lowest possible k.

The highest or lowest possible k is, in each case, the highest or lowest one, respectively, permitted by the present value of B and the last previous value of A, the relationship being given by items of information (1), (2) and (3).

The following are two of the many histories of S that might follow, insofar as we "presently" know, the adoption of action $\mathfrak{A}$. (Ignore for the moment the numbers to the right.)

History $\mathfrak{A}_1$*:*	*Relevant Criterion*	*Raw Score*	*Standard Score*
$(a_1\ b_1\ c_1\ d_1\ t_1)$	b_1	3	3
$(a_4\ b_2\ c_3\ d_3\ t_2)$	b_2	10	12
$(a_2\ b_2\ c_1\ d_5\ t_3)$	b_2	8	14
$(a_3\ b_3\ c_1\ d_5\ t_4)$	b_3	3	7
$(a_5\ b_3\ c_4\ d_3\ t_5)$	b_2	12	10
$(a_3\ b_3\ c_1\ d_4\ t_6)$	b_3	3	7
$(a_6\ b_3\ c_4\ d_1\ t_7)$	b_3	6	13
$(a_8\ b_4\ c_5\ d_3\ t_8)$	b_4	5	3
$(a_5\ b_4\ c_2\ d_3\ t_9)$	b_4	2	15
$(a_2\ b_1\ c_2\ d_1\ t_{10})$	b_1	5	5
		Total:	89

3. Let us call this action $\mathfrak{A}$.
4. We are here taking account of the time-lag given by item of information (5).

History $\mathfrak{A}_2$*:*	*Relevant Criterion*	*Raw Score*	*Standard Score*
$(a_1\ b_1\ c_1\ d_1\ t_1)$	b_1	3	3
$(a_4\ b_2\ c_3\ d_5\ t_2)$	b_2	12	10
$(a_3\ b_3\ c_1\ d_3\ t_3)$	b_3	3	7
$(a_6\ b_3\ c_4\ d_3\ t_4)$	b_3	6	13
$(a_8\ b_4\ c_5\ d_1\ t_5)$	b_4	5	3
$(a_5\ b_4\ c_2\ d_1\ t_6)$	b_4	2	15
$(a_3\ b_3\ c_1\ d_4\ t_7)$	b_3	3	7
$(a_3\ b_1\ c_3\ d_5\ t_8)$	b_1	11	11
$(a_6\ b_3\ c_4\ d_5\ t_9)$	b_3	6	13
$(a_3\ b_1\ c_3\ d_4\ t_{10})$	b_1	10	10
		Total:	92

Note that both of these histories are consistent with all of our available information and hence are included in the space of *S*. Note also that, in both cases, the value of *C* is always either the highest or the lowest[5] consistent with the values of *B* and *A* and laws (1), (2) and (3).

The figures given to the right of the two histories represent the computations involved in the *judging* of these histories. The following procedure was used:

(a) We adopted, first, a system of assigning numbers to the "satisfactorinesses" of the various states. In the case of criterion b_1 the problem was relatively simple; we just let the sum $i + k + l$ represent the degree of satisfactoriness of a given state of *S*. The lowest degree of satisfactoriness, in this scheme, is 3, and the highest, 19.

It seemed convenient to adopt these numerical values as our *standard* scores, and to convert the scores of the various states according to the three other value criteria to the same numbers.

1. According to criterion b_2, the sum $i + k + l$ also represents the satisfactoriness of a state of *S*, but with 19 being the lowest value and 3 the highest. The translation to the standard score is therefore the following:

Raw Score:	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
Standard Score:	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3

2. According to criterion b_3 the value of i serves as a raw score, ranging from a low of 1 to a high of 9. The translation is:

Raw Score:	1	2	3	4	5	6	7	8	9
	↓	↓	↓	↓	↓	↓	↓	↓	↓
Standard Score:	3	5	7	9	11	13	15	17	19

3. According to criterion b_4 the value of k serves as a raw score, ranging from a low of 5 to a high of 1. The translation is:

Raw Score:	1	2	3	4	5
	↓	↓	↓	↓	↓
Standard Score:	19	15	11	7	3

5. Depending on the value criterion applicable in the case.

(b) Next, we proceeded to judge each of the ten states in the respective histories separately. Consider, for example, history $\mathfrak{A}_2$. The criterion relevant for judging the *first* state is b_1. The raw score therefore is $1 + 1 + 1 = 3$, and this is also the standard score. For judging the *second* state, criterion b_2 becomes relevant. Here the raw score is $4 + 3 + 5 = 12$, which, according to the translation given above, is equivalent to a standard score of 10. To take another example, for the judging of the *sixth* state criterion b_4 is to be used. The value of k in that state is 2, making a standard score of 15. The other states in $\mathfrak{A}_2$ (and all the states in $\mathfrak{A}_1$) were judged by the same procedure.

(c) Since we had assumed a time-preference criterion assigning equal weights to the satisfactorinesses of all states, and since the adoption of standard scores made the satisfactorinesses comparable, we could determine the satisfactorinesses of the two histories as a whole by simply adding the standard scores of the component states. Accordingly, the score of history $\mathfrak{A}_1$ came out to 89, and of $\mathfrak{A}_2$ to 92[6].

The *outcome* of action $\mathfrak{A}$ consists of histories $\mathfrak{A}_1$ and $\mathfrak{A}_2$, as well as of *all* the many other histories in the space of S consistent with $\mathfrak{A}$. In order to determine the significant worth of the action we should have to judge *all* the histories in its outcome in the same way as we judged $\mathfrak{A}_1$ and $\mathfrak{A}_2$. In the present case, since the actor subscribes to the *minimax* risk-taking criterion, the significant worth of $\mathfrak{A}$ would be the *lowest* of the scores of the histories in its outcome.

After having done all the above, we have ascertained the significant worth of only *one* of the many actions available to the actor. In order actually to choose an action, the actor needs first to determine the significant worths of all of the other possible actions as well. The actor is behaving rationally if he then chooses the action with the *highest* significant worth.

SUMMARY

In recent years there has been a great development of interest in the principles and the problems of rational decision-making and rational action. Economists, mathematicians, statisticians, logicians, engineers, and philosophers have all addressed their efforts to various phases of the general problem of rationality. This paper attempts a provisional synthesis of their basic results so far, in the form of a suggested preliminary definition of rationality that is sufficiently general to be applicable in all circumstances.

The general definition of rationality, to be usable for "practical" decision-making, must take full cognizance of each of the following characteristics of the "real" world, at least: the time-dimension of action and of the consequences of

6. We are *not* forgetting here that persons, in applying their value criteria to the evaluation of the world, usually judge an entire *sequence* of *events* as a *unit* rather than the individual states separately. In our terminology, the specification of each state includes the remembered past and the expected future at that time point. The value criterion subscribed to at a given moment is, therefore, applied to an entire profile of occurrences, as it exists in the actor's mind at that moment. Our example is so simplified that this fact is not apparent from it.

the action; the multitudinous side-effects of an action; the inevitable uncertainty of the "actor" in connection with the alternatives of action open to him and the consequences of each of these; the costs of information-gathering; the costs of performing logical operations; the variety of the value-criteria of different actors; the changes in the value-criteria of any given actor over time; and the "tastes" of the actor in relation to time-preference, risk-taking, logical processes, and the facing of uncertainty. The definition of rationality should specify the course of action which, in the light of all these factors, is the "best" one.

The present suggested definition outlines a "rational" procedure for choosing one from among the set of all known possible actions, where the word "action" refers to a particular time-sequence of (a) acting (in the usual sense), (b) information-gathering, and (c) logical analysis. The procedure consists, roughly, of these four steps: (1) the specification of the set of known possible actions; (2) the determination, for *each* of the actions, and using all available relevant information, of the set of all possible consequences of that action and their respective probabilities; (3) the evaluation, in the light of the relevant value-criteria, of each of the possible consequences of each of the possible actions; and (4) the derivation from (3) of the "correct" action to be adopted. In carrying out these steps we employ a logical construction patterned after those of Carnap, Hempel and Oppenheim.

For the sake of greater understandability, the definition is presented in two stages. The appendix to this paper contains a (grossly oversimplified) illustration of the application of the definition.

ZUSAMMENFASSUNG

Beitrag zu einer allgemeinen Definition des rationalen Handelns. In den letzten Jahren ist ein zunehmendes Interesse an den Grundlagen und den Problemen der rationalen Entschlussfassung und rationalen Handelns festzustellen. Ökonomen, Mathematiker, Statistiker, Logiker, Ingenieure und Philosophen haben ihre Anstrengungen auf verschiedene Phasen des allgemeinen Problems des Rationalen gerichtet. Die vorliegende Studie macht den Versuch einer vorläufigen Synthese der bisherigen grundlegenden Ergebnisse in Form einer vorläufigen Definition des Rationalen, die genügend allgemein ist, um unter jeglichen Bedingungen anwendbar zu sein.

Die allgemeine Definition des Rationalen – soll sie für praktische Entschlüsse verwendbar sein – muss zumindest folgende Charakteristika der «realen» Welt voll berücksichtigen: die Zeitdimension einer Handlung und der Konsequenzen der Handlung; die zahlreichen Nebenwirkungen einer Handlung; die unvermeidliche Ungewissheit des Handelnden mit Bezug auf die ihm offenstehenden alternativen Handlungen und auf die Folgen jeder dieser Handlungen; die Kosten zusätzlicher Information; die Kosten des logischen Vorgehens; die Mannigfaltigkeit der Wertkriterien der verschiedenen Handelnden; die Änderungen in den Wertkriterien eines Handelnden im Zeitverlauf; die Einstellung des Handelnden hinsichtlich Zeitpräferenz, Risikobereitschaft, logische Verfahren und Ungewiss-

heit. Die Definition des Rationalen sollte jenen Ablauf des Handelns aufzeigen, der im Lichte aller dieser Faktoren der «beste» ist.

Die hier vorgeschlagene Definition skizziert ein «rationales» Verfahren für die Wahl einer Handlung unter all den bekannten möglichen Handlungen, wobei das Wort «Handlung» sich auf eine besondere Zeitfolge von Handeln (im üblichen Sinn), Information und logischer Analyse bezieht. Das Verfahren besteht, grob gesprochen, in folgenden vier Schritten: 1. Spezifikation der bekannten möglichen Handlungen; 2. Bestimmung aller möglichen Folgen und der Wahrscheinlichkeit dieser Folgen für *jede* der Handlungen, unter Verwendung aller verfügbaren relevanten Informationen; 3. Wertbestimmung jeder möglichen Folge von jeder der möglichen Handlungen auf Grund der relevanten Wertkriterien; und 4. Ableitung der «richtigen» vorzunehmenden Handlung aus 3. Bei der Ausführung dieser Schritte wird eine logische Konstruktion verwendet nach dem Muster von Carnap, Hempel und Oppenheim.

Im Interesse einer grössern Verständlichkeit wird die Definition in zwei Stufen entwickelt. Der Anhang enthält eine (stark vereinfachte) Illustration über die Anwendung der Definition.

RÉSUMÉ

Recherche d'une définition générale de l'action rationnelle. Durant ces dernières années, l'intérêt s'est fortement accru pour les principes et les problèmes relatifs à la décision rationnelle et à l'action rationnelle. Des économistes, des mathématiciens, des statisticiens, des logiciens, des ingénieurs et des philosophes ont concentrés leurs efforts sur les différentes phases du problème général de la rationalité. La présente étude constitue un essai de synthèse provisoire des résultats fondamentaux obtenus jusqu'ici, sous la forme d'une définition préliminaire de la rationalité, par ailleurs suffisamment générale pour être applicable dans toutes les circonstances.

Une définition générale de la rationalité – pour qu'elle soit utilisable pour des décisions pratiques – doit pour le moins tenir pleinement compte de chacune des caractéristiques suivantes du monde «réel»: la durée de l'action et des conséquences de l'action; la multitude des effets connexes d'une action; l'inévitable incertitude de celui qui agit en ce qui concerne les alternatives qui s'offrent à lui et les conséquences de chacune de ces actions; le coût des informations complémentaires; le coût de l'exécution logique des opérations; la diversité des critères-valeur, suivant l'opinion de ceux qui agissent; les modifications dans le temps des critères-valeur d'un exécutant donné; la préférence que marque celui qui agit quant au temps, au risque, à la procédure logique et à l'incertitude. La définition de la rationalité devrait spécifier le déroulement de l'action, qui, à la lumière de tous ces facteurs, apparaît comme «la meilleure».

La définition proposée ici esquisse une procédure rationnelle pour le choix d'une action parmi toutes les actions reconnues possibles; en l'occurrence, le mot action se rapporte à une suite chronologique a) d'actions (au sens usuel), b) d'informations et c) d'analyses logiques. *Grosso modo*, le processus comprend les quatre

étapes suivantes: 1° la spécification des actions connues possibles; 2° la détermination pour *chacune* des actions, et en utilisant toutes les informations disponibles entrant en ligne de compte, de toutes les conséquences possibles et de leurs probabilités respectives; 3° l'évaluation, à la lumière des critères-valeur entrant en ligne de compte, de chacune des conséquences possibles de chacune des actions possibles; et 4° la déduction de 3° de l'action «correcte» à exécuter. En exposant ces étapes, l'auteur utilise une construction logique calquée sur celles de Carnap, Hempel et Oppenheim.

Afin d'être mieux compréhensible, la définition est présentée en deux paliers. L'annexe à cet article contient un exemple (considérablement simplifié) de l'application de la définition.

THE WEALTH OF NATIONS WITH A GRAIN OF SALT

I

Fearing that after his death impious prowlers might desecrate his tomb, Cheops—we are informed by Herodotus—decided to build a pyramid in which his mummy would be well protected; a structure such as had never been built before and was not to be built in the future. A hundred thousand men were conscripted who, in lots relieved every three months, within ten years raised a causeway on which the stones were hauled. It took them another twenty years to complete the pyramid, a square 756 feet each way and 480 feet high. On it, the ruler of Egypt let engrave in sacred characters the quantity of radishes, onions, and garlic consumed by the labourers during their work.

Fifty centuries have passed and the diet of the Egyptians, like that of most peoples, has changed less than the Great Pyramid itself. Bread and garlic, or onions, in Europe and Africa, a bowl of rice in Asia, tortillas in the Americas, are still the staple food of four-fifths of the human race. Does this mean that the history of mankind is forever going to remain the story of a hungry creature in search of food? And is the freedom from want never to be more than the carrot held before the noses of impoverished peoples to enlist their support in time of war[1]?

The ancients certainly did not believe in general and lasting prosperity. The best they could hope for, under the circumstances in which they lived, was freedom from starvation. Accordingly, their philosophers taught that happiness should be sought in wisdom, not wealth. SOCRATES used to ask: "You my friend—a citizen of the great and mighty and wise city of Athens—are you not ashamed of heaping up the greatest amount of money and honor and reputation, and caring so little about wisdom and truth and the greatest improvement of the soul, which you never regard or heed at all?" The Stoics are said to have taught that a man should be able to subsist on an olive a day. PLATO went a step further: he rationalized the familiar social reflex which makes people praise as virtues what are in fact crude necessities. Luxury, according to him, would require additional labour force to turn out the superfluities. A community given to luxury would need, therefore, a larger population than would a frugal state. In order to feed a larger population, more tillable land would be required, hence friction and conflict with adjoining communities. Any departure from the principle of a frugal life was, for that reason, to be considered dangerous, and to be avoided.

In Rome, too, simplicity prevailed for many generations. JULIUS CAESAR distributed what was thought to be a lavish gift: to every man of the people ten pecks of grain and the same number of pounds of oil, plus 400 sesterces (about $16). But the common food of the Roman soldier remained bread, often made of barley meal. His drink was sour wine, or vinegar mixed with water *(posca)*. The display and sale of refined foods in taverns was repeatedly forbidden. To the complaints about the scarcity and high price of wine in Rome, AUGUSTUS replied: "My son-

1. As asserted, for instance, by WILLIAM VOGT, *Road to Survival*, New York 1948, p. 44.

in-law Agrippa has taken good care by building several acqueducts, that men shall not go thirsty." When Christianity, the religion of slaves and proletarians, triumphed, it proclaimed it easier for a camel to pass through a needle's eye than for a rich man to enter the Kingdom of Heaven.

For fifteen centuries frugal life was preached by the church and accepted by the people as a salutary religious dogma and a sound moral principle. So deep were the roots of this conviction that MACHIAVELLI, writing as late as the time of the Reformation, advised that in well-regulated republics the state ought to be rich and the citizens poor[2]. There must have been some blinking among philosophers in limbo when, less than a century later, HENRI IV of France declared that he would like to see on Sundays a chicken in every farmer's pot. This was certainly a new outlook—determined largely by a unique event.

II

In 1492, sailing in a vessel which Mark Twain once described as a leaky bucket, Christopher Columbus had discovered the New World. The Council of Castile took possession of the new lands, allegedly with a view to converting them to Christianity. Sophisticated people, however, saw in this act a more practical purpose.

> "For, where there is no store of wealth,
> Souls are not worth the charge of health.
> Spain, in America, had two designs
> To sell their Gospel for their mines.[3]"

In any case, the *conquistadores* soon began chasing, enslaving, torturing and murdering the natives for their gold, and large shipments of the yellow metal began to pour on to the markets of Europe. Adam Smith who calls the discovery of America, and that of a passage to the East Indies by the Cape of Good Hope "the two greatest and most important events in the history of mankind", tells us that, by opening up new channels of trade, these discoveries contributed "to increase the enjoyments and to augment the industry" of most European countries. The gold of the American mines, by stimulating the demand for commodities, multiplied trade and production and led to the "sumptuous profusion of the merchants of Cadiz and Lisbon"[4].

Meanwhile, enterprising merchants began to gang up and organize expeditions for the capture of Spanish treasure ships; these ventures were financed like regular business speculations. We have it on Keynes' authority, that "the boom period in England definitely began with the return of Drake's first important expedition

2. He also praised the poverty of Cincinnatus and the wisdom of the Romans in not distributing to their settlers more than two-and-two-thirds acres of land, "because the Romans were poor at home, and it would not have been reasonable that they should have wished their colonists to become used to too much abundance . *Discourses*, Book I, chapter 37; Book III, chapter 25, and Book II, chapter 7.

3. SAMUEL BUTLER, *Hudibras*, (Cf. Grey's edition, London 1801 , vol. I, p. xiv.)

4. *Wealth of Nations*, The Modern Library Edition (1937), p. 558 and 592. ADAM SMITH refers, in this connection, to the opening sentence of RAYNAL's *Histoire Philosophique*, which strongly emphasizes the importance of the discovery of America and of the passage to the East Indies around the Cape.

(his third voyage) in 1573, and was confirmed by the immense gains of his second expedition which returned home in 1580, whilst his third expedition of 1586 was not entirely negligible. The value of gold and silver brought back in the Golden Hind, which was carefully concealed at the time, has been variously estimated by historians at anything from £300,000 to £1,500,000. . . . The effect of these great influxes of money in establishing 'the eleven years of great prosperity', from 1575 to 1587, must have been predominant. . . .[5]" Keynes also tells us that "the booty brought back by Drake in the *Golden Hind* may fairly be considered the fountain and origin of British Foreign Investment. Elizabeth paid off out of the proceeds the whole of her foreign debt and invested part of the balance (about £42,000) in the Levant Company; largely out of the profits of the Levant Company there was formed the East India Company, the profits of which during the seventeenth and eighteenth centuries were the main foundations of England's foreign connections; and so on.[6]"

As large private fortunes were amassed and wealth became accessible to an increasing number of individuals in the countries along the Atlantic fringe of Europe, the question, *how does a nation become rich*, no longer seemed fantastic. In France, a debate arose, at the turn of the sixteenth century, on the relative merits of agriculture and manufacturing. The views of SULLY, summed up in the celebrated saying *labourage et pâturage sont les deux mamelles de la France*, were opposed by BARTHÉLEMY DE LAFFEMAS, who advocated the establishment of manufactures, and who wrote a pamphlet—among many others—on the ways and means of banishing poverty from the country[7]. Soon afterwards, ANTOINE DE MONTCHRÉTIEN published (1615) his *Traicté d'œconomie politique*, which was to give a name to the budding science of national wealth and income: *political economy*[8].

The Thirty-year War on the Continent and the Civil War in Britain, which took place during the second quarter of the seventeenth century, were not favourable to the advancement of the new science. But at the end of these upheavals, William Petty produced a series of fine works dealing with policies apt to increase the wealth of the Kingdom. The end of that century was marked by the appearance of Boisguillebert's works in France, which were to be followed by those of Turgot and the Physiocrats, while in Britain the torch of the new branch of knowledge was to be lifted high by ADAM SMITH and his followers.

III

We shall return presently to the rather peculiar way in which some modern writers have attributed to political economy purposes other than the study of the prerequisites of general and lasting prosperity. Let us note, here, that in the opinion of the classicists *ever-growing prosperity of the nation as a whole* was the main object of economic research.

5. *A Treatise on Money*, 1930, vol. II, p. 156/157.
6. *Ibid.*
7. *Moyen de chasser la gueuserie de France* (1601).
8. About the same time, conditions were maturing in England for the blossoming of the controversy between THOMAS MUN and GERARD DE MALYNES, regarding the effects of the export of precious metals (*ca.* 1622).

In his *Political Arithmetic* (1671), WILLIAM PETTY proposed to show "that a small country, and few people, may by their situation, trade, and policy, be equivalent in wealth and strength, to a far greater people and territory"[9]. Elsewhere, he devoted a special chapter to the question "how to enable the people of England and Ireland to spend, in the several comforts and conveniences of life, 5 Millions-worth of Commodities per Ann. more than at present. . . .[10]" He was confident that increased productivity and a proper distribution of the national product would tend to reduce crime and beggary, for "it is against nature, that any man should venture his life, limb, or liberty, for a wretched livelihood, whereas moderate labour will produce a better"[11]. After having figured out the amount necessary for maintaining all the impotent of Ireland, he observed: "For other Beggars, as also Thieves and Rebels, which are but bigger Thieves, are probably but the faults and defects of Government and Discipline.[12]"

The meaning which the Physiocrats gave to the term "economic" is, perhaps, best illustrated by the title of DUPONT DE NEMOUR'S book: *Physiocratie ou Constitution essentielle du gouvernement le plus avantageux au genre humain* (1761). This book followed close upon QUESNAY'S *Maximes générales du Gouvernement économique d'un royaume agricole* (1760), which represents an expansion of his *Tableau économique* (1758). On top of the latter, Quesnay placed the motto: *Poor farmers, poor Kingdom! Poor Kingdom, poor King!*

According to ADAM SMITH, "the great object of the political economy of every country is to increase the riches and power of that country". He thought that "political economy, considered as a branch of the science of a statesman or legislator, proposes two distinct objects; first, to provide a plentiful revenue or subsistence for the people, or more properly to enable them to provide such a revenue or subsistence for themselves; and secondly, to supply the state or commonwealth with a revenue sufficient for the public services. It proposes to enrich both the people and the sovereign.[13]"

DAVID RICARDO, who has been called the most influential economist of the nineteenth century, did not believe in the existence of laws regulating the total amount of wealth in a given community, although he thought that "men are happy in proportion as they have an abundance of the commodities they want"[14]. Nonetheless, he wrote to Malthus: "I wish much to see a regular and connected statement of your opinions on what I deem the most difficult and perhaps the most important topic of political economy, namely, the progress of a country in wealth, and the laws by which the increasing product is distributed.[15]"

In the eyes of SISMONDI, "political economy becomes, in general, the theory of charity, and everything that does not concern ultimately the happiness of

9. *The Economic Writings of Sir William Petty*, edited by Charles H. Hull, Cambridge University Press, 1899, vol. I, p. 274.
10. *Ibid.*, vol. II, p. 537.
11. *Ibid.*, vol. II, p. 475.
12. *Ibid.*, vol. II, p. 189.
13. *Op. cit.*, p. 397.
14. *Notes on Malthus' "Principles of political Economy"*, edited by Hollander and Gregory, Baltimore 1928, p. 6.
15. *Letters to Malthus*, edited by James Bonar, Oxford 1887, p. 111.

mankind does not belong to this science"[16]. He observed that "political economy must teach us the theory of welfare for all", and explained that "the increase of wealth is not the purpose of political economy, but rather a means which it may use for providing happiness for everybody"[17]. "I believe", he wrote, "that I have placed political economy on a new foundation, by determining the income of us all, as well as by investigating the distribution of that income, which bestows the greatest happiness on the nation, and which, consequently, fulfills best the purpose of science.[18]"

Certainly, before deciding that because four-fifths of the human race have always lived in poverty they must forever remain in that condition, it is in order to see what the classical economists had to say on this subject. But, it may be asked, why go back to the classicists, when our bookshelves are groaning under the weight of recent economic literature? Because today, more perhaps than at any other time, we are not a little confused about the purpose of economics. Whoever thought up the quip that if one put all economists end to end starting from Picadilly they would still reach no conclusion, might well have been thinking of the variety of opinions existing on this point. What are we told, indeed, about the purpose of economics, by our modern scientists?

IV

VILFREDO PARETO enumerates the following, in his opinion, possible aims of political economy: "(a) to compile useful information for private individuals and public authorities, enabling them to guide their economic and social activities; (b) to disclose a doctrine which (according to its author) could bestow on a nation all sorts of benefits; (c) to investigate the uniformities which may be found in certain phenomena, that is to say their laws; the purpose here being solely that of *understanding*, or knowledge.[19]" Whereupon he hastens to warn the reader that the purpose of his own book is exclusively the last one[20]. In order to make his position perfectly clear, Pareto gives an example: "How many pearls are being sold, on the average, each month, each year, in England?—This is an economic problem.[21]"

We are told by SCHUMPETER that to explore the process of distribution "was and remains the sole purpose of many economic systems"[22]; his own purpose being "to explain the price phenomenon, and to establish some formal dynamic laws"[23]. To RAYMOND T. BYE, "economics is that branch of learning which deals with the social organisation and process, by which scarce means of production are directed towards the satisfaction of human wants"[24]. GAËTAN PIROU wrote that economics

16. *Nouveaux principes*, Paris 1819, vol. II, p. 250.
17. *Nouveaux principes* (2nd edition), Paris 1827, vol. I, p. iv, and vol. II, p. 373.
18. *Ibid.*, vol. I, p. xiv.
19. *Manuel d'économie politique*, Paris 1909, p. 3.
20. *Ibid.* Pareto quotes the definition given by Adam Smith, noting that it corresponds to the first of the three aims listed above. "Fortunately", he adds with a note of pride, "Smith does not abide by his definition and frequently takes our third view". *(Ibid.*, p. 4.)
21. *Ibid.*, p. 52.
22. *Das Wesen und der Hauptinhalt der theoretischen Nationalökonomie*, Leipzig 1908, p. 315.
23. *Ibid.*, p. 52.
24. "The Scope and Definition of Economics", *Journal of Political Economy*, October 1939, p. 623.

aims at explaining "exchange phenomena, where an individual abandons to somebody else a commodity he owns, so that he may get another one which he desires—phenomena that throw a bridge between the production of wealth and the satisfaction of wants"[25].

The purpose of economics becomes still more abstract, almost ethereal, in the works of WILHELM RÖPKE, who thinks that "economics is nothing but the science of alternatives"[26]. Professor LIONEL ROBBINS considers that "economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses"[27]. He openly declares that the object of his inquiries has nothing in common with the object of classical political economy. "We no longer inquire concerning the causes determining variations of production and distribution. We inquire rather concerning the conditions of equilibrium of various economic 'quantities', given certain initial data, and we inquire concerning the variations of these data.[28]" Much in the same spirit, LUDWIG VON MISES writes: "Ever since there is a question of Political or Social Economy, or simply of Economics, the purpose of this science has been considered to consist in the study of market phenomena, *i.e.* the formation of reciprocal exchange relations between the goods and services traded on various markets, the origin of these exchange relations in human action, and their impact on further action.[29]"

Can there be the remotest relation between classical economics and the intellectual pursuits to which the "new" definitions refer? If not, then the sooner modern economics chooses for itself another name—whether catalactics, as proposed by Bishop Whately, or something else—the sooner is the confusion going to be cleared up. If, on the other hand, the existence of a logical relation between the two is admitted, if, specifically, modern economics wants to be regarded as an enlargement and refinement of the earlier body of thought, then it follows that the two must stand or fall together, and we are back to our original question.

V

The trouble is, of course, that classical economists were not of one mind with respect to the recipe for producing general and lasting prosperity. Three trends of thought run through the works of the better-known authors of that period. In the *first* place, there were those who seem to have believed that general and lasting prosperity is an unattainable objective, no matter what people do. Whoever accepted Malthus' principle, according to which "population, when unchecked, increases in a geometric ratio, subsistence increases only in an arithmetic ratio", could hardly avoid this conclusion. In the *second* place, there are the spiritual forefathers of Cobden, Bastiat and Michel Chevalier, who believed that a few simple rules like "low taxes", "freedom of trade" and "security of property" would do the trick. Ricardo's theory of comparative costs, although originally formulated

25. *Introduction à l étude de l'économie politique*, Paris 1939, p. 88.
26. *Explication économique du monde moderne*, Paris 1939, p. 46.
27. *An Essay on the Nature and Significance of Economic Science* (2nd edition), London 1935, p. 16.
28. *Ibid.*, p. 67.
29. *Nationalökonomie*, Geneva 1940, p. 224.

with respect to foreign trade, when applied consistently to all categories of exchange, actually lends support to this view. If this theory was correct, we would hold the answer to the Sphinx's riddle, and it would not matter much if some modern authors continue to adorn this answer with ringing Greek terms and smart algebraic formulae. In the *third* place, there are those authors who believed neither in Malthus' principle of population, nor in the theory of comparative costs, but who taught that securing general and lasting prosperity was a full-time job for the scholar and the statesman, to be done day-by-day, keeping close watch over the effects of technological changes and gently but steadily adjusting the existing institutions to the newly arisen conditions of production and distribution.

Among the last group of authors, JOHN BARTON, WILLIAM GODWIN, and J. C. L. SIMONDE DE SISMONDI deserve particular attention[30]. These scholars pointed out that if the *virtual* increase of the human species is in a geometric ratio, so is the virtual increase in the vegetal and animal realms, and the ratios there are actually higher. The *actual* growth of human populations, however, is never "unchecked". GODWIN calculated that, with the primitive Chinese technology, the inhabitable territories of the earth could have supported 9 billion people[31]. The fact that this figure is a multiple of the maximum ever attained strongly supports the view that the actual increase is a process more complicated than Malthus thought[32]. Both GODWIN and SISMONDI showed that, if there is a rule of conduct which has been followed faithfully by human populations throughout the history of civilization, it is never to exceed the limits of subsistence, even at the cost of such cruel *mores* as abortion and infanticide, not to speak of the celibacy in which a large proportion of the population found itself more or less compelled to live. Rapid population growth, they observed, took place only under exceptional circumstances: when the productivity of labour was suddenly increased—by the discovery of new and fertile lands, or by that of more efficient methods of production; or when traditional forms of social and economic organization were suddenly disrupted, so that people could no longer form a correct idea of the factors determining their future income.

It seems to follow, then, that with a rising productivity of labour and standard of living we *may* get fast population growth. With a stable or falling productivity, we usually get a stable or a declining population. And we have learned, from experience, that we may get a stable, or a declining, population even with a rising productivity. To advise the citizens of the economic prospects of the country, so that population may grow at a rate suitable to the existing resources, or so that a certain demographic equilibrium may be maintained, appears, therefore, to be one of the first duties of every government.

BARTON and SISMONDI observed, further, that the Ricardian theory suffers from flaws which make it inapplicable to the real world of the nineteenth—and we may add the twentieth—century: it does not explain the mechanism of the progress of

30. Cf. JOHN BARTON, *Observations on the Circumstances which Influence the Condition of the Labouring Classes of Society*, London 1817 (reprinted in Baltimore 1934); also his other tracts. WILLIAM GODWIN, *On Population*, London 1820. J. C. L. SIMONDE DE SISMONDI, *Nouveaux principes d'économie politique ou de la richesse dans ses rapports avec la population*, Book VII (3rd edition, Geneva/Paris 1951–1953).

31. *On Population*, p. 448/449.

32. Incidentally, it is frequently forgotten that Malthus copied his "principle of population" from JOSEPH TOWNSEND's *Dissertation on the Poor Laws* (1786).

wealth, and it leaves the problem of the overall allocation of resources untouched. Accordingly, they expected from the Government to place a solid bottom under the living standard of every family in the nation. This they considered indispensable, if the rapid increase of the productivity of labour was to be of advantage to the whole nation, instead of splitting it up and leading it through a period of convulsions. They were familiar with cases recorded in history—imperial Rome is such a case—where large population strata sank into poverty and, within a few generations, disintegrated and vanished, although enormous fortunes were being made at the same time in other sections of the same community[33]. At times, the transition would be too abrupt; friction would, then, develop, leading often to violence, and the progress of civilization would be set back by decades, if not centuries. Something to ponder, indeed, if we are really standing at the threshold of an atomic age, with an imminent increase of the productivity of labour that would dwarf the miraculous chain reaction touched off by the discovery of America.

What would happen, then, supposing that this planet achieves a new demographic equilibrium, say within the next century, while the productivity of labour continues to augment? When everybody's standard of living is raised to the level now enjoyed by one-fifth of the earth's population, or above it, would we not find ourselves in a state of chronic overproduction, throwing the economic apparatus out of gear, causing unemployment and the much dreaded poverty amidst plenty?

Such a calamity need not occur, although it could, unfortunately. It could, if the world persists in running its business without the powerful priesthoods, which built the wondrous temples of the Orient and the lofty cathedrals of the Middle Ages, without administrations like the ones of Pericles and Caesar, given to the building of roads, waterworks and public edifices, above all without the rich imagination and strong civic spirit in the people, that are necessary for the development of the arts and sciences, and in the absence of which the *wealth of nations* itself might easily remain a dream[34].

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33. SISMONDI, *op. cit.*, 3rd edition, vol. I, p. 151–154.

34. Note that Sir WILLIAM PETTY wrote in his *Treatise on Taxes and Contributions:* "When all helpless and impotent Persons were thus provided for, and the lazy and thievish restrained and punished by the Minister of Justice, it follows now, that we finde out certain constant Employments for all other indigent people, who labouring according to the Rules upon them, may require a sufficiency of food and raiment. Their Children also (if small and impotent) as aforesaid, being provided for elsewhere.

But what shall these employments be? I answer, such as were reckoned as the sixth Branch of the Publick Expence, *viz.*, making all High-wayes so broad, firm, and eaven, as whereby the charge and tedium of travelling and Carriages may be greatly lessened. The cutting and scowring of Rivers into Navigable; the planting of useful Trees for timber, delight, and fruit in convenient places. The making of Bridges and Causeways. The working of Mines, Quarries and Colleries. The Manufactures of Iron, &c.

I pitch upon all these particulars, first as works wanting in this Nation; secondly, as works of much labour, and little art; and thirdly, as introductive of new Trades into *England*...." (*The Economic Writings of Sir William Petty*, vol. I, p. 29/30.)

SPIETHOFF'S VIEWS ON THE BUSINESS CYCLE*

The third number of *International Economic Papers* differs from the previous ones in several respects. Each of the others contained only two articles not of post-war origin, but only three papers in the present volume are post-war. Of the other papers in this issue, one was published in 1941, one in 1923, and five (four of which make up a single correspondence) in the first decade of the century. Also unlike the previous issues, most of this volume is devoted to macro-economics. One should not conclude, however, that this gives the volume any very substantial unity.

Dominating the volume are papers by Spiethoff, Wicksell, and Palander. SPIETHOFF's paper, a translation of his *Handwörterbuch der Staatswissenschaften* article of 1923, is in every way the *pièce de résistance*. Together with a new introduction by the author, it occupies almost forty percent of the total number of pages.

English readers who (like the reviewer) have long known about the Spiethoff article but never had the courage to tackle it in German should be exceedingly grateful for the translation of this major work on cycles by a major student of the subject. (Previously available in English was only his brief and unsatisfactory selection on "overproduction" in the *Encyclopaedia of Social Sciences*.[1])

The paper has three major sections. The first is devoted to a description of the "characteristic phenomena" of the business cycle. The objective of this part is essentially the same as that of the National Bureau of Economic Research in the United States, well summarized in the title of Wesley Mitchell's posthumous volume, "What Happens During Business Cycles". Actually, there are many similarities to the National Bureau's approach and philosophy, although none of the statistical nicety of its "reference cycle patterns". The effort is made, for a wide range of activities, to construct typical patterns of behavior over business cycles, distinguishing the "insignificant from the decisive, the regular from the casual", constructing models of "reality purged of historical accidents". Data from France, U.K., U.S., and Germany are used (as by the Bureau), and Spiethoff does not hesitate to combine evidence from them all in his search for regularities. One is impressed that Spiethoff squeezed almost everything there was to be obtained from the data then available. The only major descriptive generalization which is probably incorrect—even for the period covered—is the conclusion that direct consumption had no clear cyclical pattern. Spiethoff's evidence related mainly to physical quantities of goods primarily of agricultural origin, which all studies show to be independent of cycles. This reminds us, however, that until very recently the largest part by far of total consumption has consisted of such goods and the services of durables (like housing) which do not fluctuate cyclically.

* Also a review of *International Economic Papers No. 3*. Translations prepared for the International Economic Association. Edited by ALAN T. PEACOCK, RALPH TURVEY, and ELIZABETH HENDERSON. London and New York, 1953. Macmillan. 255 p. S. 15.

1. The English reader has had, however, two good summaries of SPIETHOFF's views, one by G. HABERLER, *Prosperity and Depression* (3rd ed., Geneva 1941, League of Nations), p. 72–85; the other by A. HANSEN, *Business Cycles and National Income* (New York 1951, W. W. Norton), p. 292–300. The emphasis of these two summarizers is different, but the translation shows that both were accurate.

The second major section is an impressive historical account of cycles over the period 1822–1913. Thus Spiethoff not only split business cycle phenomena longitudinally—summarizing the characteristic way in which each activity behaved during a series of cyclical fluctuations—but also split vertically—summarizing the characteristic features of business behavior in specific historical cycles and groups of cycles. In this respect Spiethoff's descriptive summary is conceived more broadly than Wesley Mitchell's—the National Bureau's descriptive work is largely confined to the longitudinal summary.

The final major section constitutes Spiethoff's "explanation" of the cycle. Although this must be accounted a failure, it surely represents the best effort of its time, and is far superior to many which came later. Further, it is full of the *materials* for a theory—or several theories—of the cycle.

In the first place, the theory emphasizes that it is fluctuations in investment activity which dominate, carrying along with it total production and employment (and, despite his previous uncertainty, this section suggests probably consumption, too). Fluctuations of investment are explained in psychological terms[2]; and as a result of waves of innovation, in a manner very reminiscent of Schumpeter.[3] Interwoven with these quite adequate and impressive explanations is one which involves the confusions which Spiethoff shares with several other "overinvestment" theorists, particularly Tugan-Baranowsky and Cassel. These confusions involve, in one sense or another, the idea that during the depression saving exceeds investment, the excess accumulating to feed the boom, with the exhaustion of the excess bringing the boom to an end. There seem to be only two solid senses in which any real meaning can be given to this, neither one, quite obviously, what Spiethoff had in mind. First, during a downswing, if the quantity of money contracts by less than the money volume of transactions, idle balances will necessarily accrue somewhere. These can then help "finance" the upswing. Second, during depression, the bank reserves which drained into circulation during the preceding boom may flow back into the banks, becoming available to finance an expansion of notes or deposits. But Spiethoff clearly denies that it is only money that is lacking to keep the boom going.

What he does clearly show is that the investment boom is likely to lead to an overexpansion of capacity in the basic industries producing materials for investment goods (the steel industry is led to expand its capacity so that it can produce enough steel to expand steel capacity—at this point, it necessarily has overcapacity). In order for these overexpanded basic industries to keep operating at capacity, investment would have to be maintained at a high rate—a rate which, together with full-employment consumption expenditures, would exceed full employment output. Thus there is "under-saving" (investment could be maintained only with lower consumption), the symptoms of which are labor shortages and inflation.

But why should this lead to generalized "overproduction" and depression? Possibly because the recognition of overexpansion in basic materials has psychological repercussions elsewhere? Spiethoff does not give us a clear answer to the

2. P. 148.

3. P. 149–151; for further resemblances to Schumpeter, see also the concluding comments on the significance of the cycle, p. 165–171.

question how excess demand and inflation can create deficient demand. But if he would merely forget about undersaving, he has an adequate explanation for the end of the boom, in the using up not of savings but of investment opportunities. The investment opportunities arose from expansion and innovation—the immediate objectives are now fulfilled. This explanation almost reaches explicit form on p. 158, and Hansen apparently found it even more explicitly in some of Spiethoff's earlier writings[4].

There is much more, on the positive side, to be said about Spiethoff's views on the business cycle, but space does not permit more than the reviewer's concluding reflection that if only the concepts of national income and product accounting had been available to Spiethoff how much better the results would have been. On the descriptive side, the concept of aggregate output and its subdivisions could replace his awkward and non-additive breakdowns of production. On the analytical side, the saving-investment confusions could have been avoided. Surely, macroeconomics could never really have developed without these concepts.

Having used up so much of his space on the *pièce de résistance*, the reviewer has only a sentence apiece available for the other items. If Spiethoff is represented by his major work, WICKSELL, a giant in the development of economic thought, is represented by a relatively trivial piece, in which he develops and tries to test the supposition that inventories move inversely to the business cycle. PALANDER's critique of Myrdal's *Monetary Equilibrium* provides a somewhat oblique analysis of the concepts and methods of the Swedish School. Some of its constructive content is less necessary in English since the publication of Bent Hansen's *A Study in the Theory of Inflation*[5].

The exchange between CROCE, the philosopher, and PARETO, the objective scientist, on the methodology and basic postulates of economics is delightful; particularly the clarity of Pareto's thinking, the logic of his argument, and the aptness of his illustrations. There is not a sentence whose meaning fails to be crystal clear.

MAURICE BYÉ provides a nice blend of theory and practical sense in his fairly definitive discussion of customs unions. Written in early 1950, the discussion reflects a more optimistic approach to European integration than one could probably muster today.

In the reviewer's opinion, the final two selections (NAVARETTE and DE NAVARETTE, *Unemployment in Underdeveloped Economies;* and HANS PETER, *A Comparison of Marxian and Keynesian Dynamics*) were not worth their translators' efforts.

All told, the volume is of very uneven merit and importance. (It surely cannot be that the editors are running out of significant materials for translation into English.) Nevertheless, Spiethoff, Palander, Pareto, and Byé make the volume worth its price.

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4. HANSEN, *op. cit.*, p. 294/5.
5. London 1951, Allen and Unwin.

WHITIN'S INVENTORY THEORY*

Dr. Whitin's cogently argued book investigates the problems of inventories, that is, commodity stocks, in the economic system at three levels. The book's part I is devoted to a theoretical examination of the elements of a rational plan of inventory management in single firms. Part II considers the relations between inventories in the aggregate and the levels and movements of output at large. Part III considers the special problems of inventory management in a national military establishment which operates on a large scale, as in the United States.

From the point of view of an economist, part I constitutes the book's most original and valuable contribution. The interest in inventories, which has developed during the last two or three decades, corresponds to the increasing preoccupation of economics with the problems of a dynamic economy. In this connection, one important problem is connected with the theory of the individual firm in a changing economy. In general, the question asked has been: How are the levels of output or of purchases, of prices and costs, altered because demand and cost functions do not remain stable, but change from period to period. Inventory policy is central to the solution because one of the main ways in which businessmen can provide for changes in the level and composition of future demand or in the cost and availability of future supply is to adjust the quantity and kinds of goods they carry in stock. Their decisions then become part of the determinants of current demand, supply and price.

Solutions to this problem have been of two sorts. One has stressed the speculative aspects of the problem and has shown the degree to which various expectations of differences between present price or cost and expected future price or cost leade to a change in the desired volume of inventories, given the cost of carrying stocks. The answers were straightforward and are still accepted for situations in which the speculative factor is dominant. The other solution has proceeded from the assumption that price speculation is often of minor importance and that the chief reason for altering the volume of stocks is the "convenience" afforded by stocks in supporting production and sales at varying levels. The element of "convenience", however, was inadequately analyzed. A common hypothesis, adopted for lack of a more reasoned basis of argument, was that firms try to keep the ratio of stocks to sales or output approximately constant. Dr. Whitin attacks this problem with considerable analytical skill and comes to quite different conclusions (chapter 3).

Dr. Whitin emphasizes that, in determining the volume of inventories to hold, a rational businessman must take account of (1) the most economical size of individual orders or of manufacturing lots, and (2) the most desirable safety allowance to provide against unexpected changes in demand or rate of receipts of raw materials. In determining the most economical size of individual orders, the firm must balance the cost of placing orders against the carrying charges for stocks. The more frequently orders are placed, the lower will be stocks and, therefore, carrying charges, but the higher will be the cost of acquiring goods. The

* A review of THOMSON M. WHITIN: *The Theory of Inventory Management*. Princeton, N.J., 1953, Princeton University Press. viii, 245 p. $ 4.50.

elements involved in attaining this balance are the volume of sales, the unit cost of purchases, the carrying charges per unit of goods held in stock, and the costs of placing orders. When sales increase, other things being equal, Dr. Whitin shows that the most economical size of orders increases less than proportionately. The same is, therefore, true of stocks insofar as these are determined only by size of orders.

In determining the size of safety allowances, the cost of carrying additional goods in stock must be balanced against losses arising from the risk that stocks may be depleted by unexpected variations in demand or in arrivals of goods. The risk of depletion, Dr. Whitin shows, is a function of the variety of goods handled, the length of time required to obtain deliveries of goods after orders are placed, and the variability of demand or of deliveries. Losses from this eventuality depend, of course, on the loss of business entailed. Dr. Whitin develops formulas to show the required variation in stocks associated with differences in the volume and variability of sales and the length of the period required to obtain deliveries (the replenishment period). On certain assumptions about the probability distribution of future sales, Dr. Whitin is again able to show that the stocks required to reduce risk of depletion to a specified level do not increase in proportion to the volume of sales[1].

Although Dr. Whitin does not apply his inventory theory to the analysis of inter-temporal changes in markets, it is clearly basic to such an analysis. Two implications of this theory should, however, be emphasized (cf. his p. 94–105 and 117–124). They derive from the deduction, already mentioned, that an increase in sales calls for a less than proportionate increase in inventories. One implication concerns the observed tendency in certain industries and, more doubtfully, in the U.S. economy at large for inventory-sales ratios to fall over time. This has, in the past, been explained largely in terms of more efficient facilities for transportation and communication, in terms of a change in the character of products handled and, in speculative terms (growth of "hand-to-mouth" buying). Whitin's analysis, however, suggests the possibility that the trend of inventory-sales ratios may represent a decline in the ratio business has an incentive to maintain—a decline which is implied in the increase over time in volume of sales per firm.

The other implication concerns the theory of those short business cycles which are often conceived to be inventory cycles. The leading theory of the subject—that of Professor Lloyd Metzler—has been called in question[2] because it required the actual inventory-sales ratio to become equal to or higher than the desired ratio before the upper turning point of the business cycle, and equal to or lower than the desired ratio before the lower turning point. The observed cyclical pattern of inventory-sales ratios, which is inverse to the volume of business, is inconsistent with this requirement if we assume that businessmen desire to maintain a constant ratio between their inventories and their sales. But what if the desired ratio also

1. There would seem to be an implicit assumption in Dr. Whitin's analysis that the volume of sales and the length of the replenishment period are independent. If they are correlated, however, because replenishment periods are longer when business is relatively active, an increase in the volume of sales may require a greater increase in stocks than Whitin's formulae suggest.

2. For example, by the present reviewer, in *Inventories and Business Cycles*, New York 1950, National Bureau of Economic Research, p. 151–153.

has a cyclical pattern inverse to the volume of business, as Dr. Whitin's theory suggests? Then the objection advanced against Metzler's theory is no longer solid[3], and one of the most suggestive of modern business cycle theories gains in credibility.

A second important problem connected with the study of economic dynamics has been that of business cycles. Changes in aggregate investment in inventories have recently received much stress, and Dr. Whitin undertakes to review the literature in part II of his book. This review is, for the most part, competently carried out; but—apart from the matter of the inventory-sales ratio already mentioned—it does not lead to contributions similar in significance to the analysis of individual firms. The same is true of Dr. Whitin's discussion, also in his part II, of inventories in connection with the analytical schemes of Leontief and others for estimating the relations between output and quantity of resources utilized.

Part III of Dr. Whitin's book is devoted to the application of his ideas to the problems of inventory control in a large military establishment. The author stresses the complications which arise from the uncertainty of demand, the huge number of items involved, the absence of the profit test and the fact that military demands in the United States have a significant influence on the economy at large. This reviewer, however, is unable to evaluate the rather special arguments raised in this section.

Dr. Whitin concludes with an interesting chapter in which, among other things, he points to a possible divergence between private and social costs of holding stocks. Dr. Whitin argues that, from the viewpoint of society, the most economical size of individual orders should be determined, in any instance, by considering the sum of the purchaser's cost of acquiring goods and the seller's cost of handling orders in conjunction with the cost of carrying stocks. As things stand, however, the size of individual purchase orders is determined by the purchaser in the light only of his own costs. Orders, therefore, tend to be too small and frequent and the stocks held too small to reduce handling costs of sellers and purchasers together to their most economical level[4].

This brief review hardly exhausts the many valuable facets of Dr. Whitin's work. He is to be congratulated for a significant contribution to inventory theory.

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3. This possibility was recognized by the present writer in the work cited, p. 152. There would still be an objection if the desired ratio did not decline faster than the observed ratio during expansions, or if it did not rise faster during contractions. But this quantitative question cannot now be settled. There is, in addition, some question whether businessmen actually behave, in this area of rather recondite calculation, as Whitin's theory prescribes.

4. Dr. Whitin's argument appears to rest on an assumption left implicit, that seller's prices do not embrace some rational system of quantity discounts.

Aktuelle Genossenschaftsprobleme. Internationale Professorenkonferenz über das Genossenschaftswesen, 7.–11. Oktober 1952, im Genossenschaftlichen Seminar Freidorf bei Basel. Bern 1953. Kommissionsverlag: A. Francke AG. 227 S. sFr. 12.–.

Im Oktober 1952 fand im Freidorf bei Basel eine internationale Professorenkonferenz über das Genossenschaftswesen statt. Eine solche Konferenz ist unbedingt zu begrüssen, denn die Genossenschaften sind eine wesentliche Erscheinung im Wirtschaftsleben der meisten Staaten. Es ist bezeichnend, dass internationale Organisationen sich mit den Genossenschaften beschäftigen und ihnen in der Wirtschaft der unterentwickelten Gebiete eine wesentliche Rolle zuschreiben. Eine Professorenkonferenz ist ferner wichtig, weil die Volkswirtschaftslehre oft das Genossenschaftswesen vernachlässigt und genossenschaftliche Praktiker meist die Praxis hervorheben und die Theorie in den Hintergrund stellen, was den über das Wirtschaftliche hinausgehenden Zielen der Genossenschaftsbewegung schadet. Da die meisten Professoren der Konferenz praktisch im Genossenschaftsleben tätig sind, war dafür gesorgt, dass die Diskussion sich nicht in unpraktischer Theorie verliert.

Es ist ferner zu begrüssen, dass die Referate der Konferenz mit ihrer sehr interessanten Diskussion in Buchform einer weiteren Öffentlichkeit zugänglich gemacht wurden. Die beiden Referate gehen von einem sehr breiten grundsätzlichen Rahmen aus, wobei das Referat von J. M. Back über die aktuelle Situation des Genossenschaftswesens, seine soziale, wirtschaftliche und kulturelle Bedeutung im Mittelpunkt steht. Der Rahmen dieses Themas ist fast zu weit; durch die sachliche Gliederung der Diskussion wird zwar die Übersichtlichkeit gewahrt, aber das Referat von H. Bayer über die Funktion der Genossenschaftsbewegung scheint dadurch eingeengt und fällt etwas ab, was an der wesentlich schwächeren Diskussion liegt.

Von den zahlreichen angeschnittenen Themen können nur einige angedeutet werden. Die Konferenzteilnehmer waren sich der Tatsache bewusst, dass eine oft rein mechanische Weiterführung der Genossenschaften nach guten alten Grundsätzen nicht genügt. So betont Back, dass die Genossenschaft noch keine endgültige Form und vollendete Gestalt gefunden hat. Die praktischen Wirtschaftsregeln von Rochdale (zum Unterschied von den tatsächlichen «Grundsätzen der Genossenschaftsbewegung», ein Unterschied, der nicht immer beachtet wird), bedürfen einer ständigen Überprüfung und Anpassung.

Die Konferenz geht klar vom Gedanken einer totalen Vergenossenschaftlichung der Wirtschaft, der einst die Idee von der genossenschaftlichen autonomen Kolonie ablöste, ab. Dieser Gedanke stand im Widerspruch zur demokratischen Einstellung (Achtung der Rechte anderer) und zur Freiwilligkeit des Genossenschaftswesens. Die richtige Beschränkung auf einen genossenschaftlichen Sektor (Fauquet) nimmt aber der Genossenschaftsbewegung ein wesentliches dyna-

misches Element, das durch ein anderes ersetzt werden muss. Die Genossenschaft kann so auch nicht *der* dritte Weg sein, wohl aber ein wichtiger Beitrag dazu.

Eine Kernfrage der Konferenz war die gemeinsame Wesensgrundlage für die Vielfalt der Genossenschaften, wie sie BACK darlegt. Die moderne Zeit hat zur Vermassung des Daseins und gleichzeitig zur Vereinsamung des Menschen geführt, der nicht mehr Persönlichkeit sein kann oder will. Weder Kollektivismus noch reiner Liberalismus können nach Back den Menschen wieder zur Persönlichkeit machen. Die Genossenschaft hingegen bildet von unten eine «personelle Kooperation» (definiert S. 21). Dieser Personalismus ist gleichzeitig das gemeinsame Merkmal aller echten Genossenschaften und ihr wichtigster Beitrag zu einer neuen Daseinsordnung.

WEISSER betont in der Diskussion, dass die Bejahung der Genossenschaften durch die verschiedensten Weltanschauungen (wozu er nicht Kommunismus und Nationalsozialismus zählt) und die Verschiedenheit der geistesgeschichtlichen Fundamente ein Vorteil und ein Aktivum der Genossenschaftsbewegung ist. Dies enthebt aber die Genossenschaften nicht der Aufgabe, ihr eigentliches Fundament zu finden; eine zu weite Ausdehnung führt zur Verwässerung des Begriffes, wofür die zahlreichen Definitionsversuche ein beredtes Zeugnis ablegen.

H. BAYER wendet sich gegen die Scheidung von «proletarischen» und «bürgerlichen» Genossenschaften und sieht das gemeinsame Band in der wirtschaftlichen Schwäche der Mitglieder. Hängt damit die Weiterentwicklung der Genossenschaftung davon ab, dass die wirtschaftlich Schwachen nicht ausserhalb der Genossenschaften durch staatliche Wirtschaftspolitik stark werden, wodurch eine zahlenmässige Ausdehnung der Genossenschaften unmöglich wird? Bayer sieht die genossenschaftliche Entwicklung parallel zur allgemeinen Tendenz der Verstärkung und Konzentration, zum Vordringen der Wirtschaftsgestaltung gegenüber der Wirtschaftsmechanik, aber konträr zur immer weiteren Trennung von Produktion und Konsum. Er sieht die Genossenschaften als dynamisches Element der Gemeinwirtschaft, was heute eher Wunsch als Tatsache ist.

Weitere schwierige Probleme konnten in der Konferenz nur angedeutet werden, so das Kernproblem der Arbeiterschaft (zum Beispiel S. 68 ff.), die Zusammenarbeit verschiedener Genossenschaftsarten (zum Beispiel S. 64 und 212), Preisbildung und aktive Preispolitik als Mittel der Monopolbekämpfung, Marktregulierung und Marktstimulierung; mangelndes oder rein wirtschaftliches Interesse der Mitglieder, Anziehungskraft für die Jugend usw. Jede Institution bedarf der geeigneten Mitglieder, und so stellt BARBIER in seinem Schlusswort die Schicksalsfrage (S. 223/24), ob der heutige Mensch auf Grund seiner Erziehung und Umgebung überhaupt ein wahrer Genossenschafter sein kann.

Wesentliche Arbeiten sind also noch notwendig, und weitere solche Konferenzen wären nur zu wünschen, denn wie die vorliegende Publikation zeigt, wurde ein erster und sehr guter Schritt bereits getan.

Universität Wien (Österreich) P. MEIHSL

WILLIAM J. BAUMOL. *Welfare Economics and the Theory of the State.* Publications of the London School of Economics. Cambridge, Mass., 1952. Harvard University Press. VII, 171 S. $ 4.25.

Die Diskussion über die Welfare Economics wird nie zu einem befriedigenden Abschluss kommen, solange sie sich nicht auf die ethischen Prinzipien erstreckt. Wenn man mit der Genugtuung, der Klippe ins Ausserwissenschaftliche abzuirren entgangen zu sein, feststellt, man benötige keiner Auseinandersetzung über die Ethik, bleibt man ganz im Positivismus der Empirie. Der Vergleich des Grades der Bedürfnisbefriedigung verschiedener Individuen erfordert nun einmal ein Werturteil, das etwas anderes ist, als die Bewertung von Dingen und Situationen der Umwelt, in der diese nur auf das Verhältnis zum eigenen Ich des Wertenden bezogen werden. – Es ist hier nicht der Ort und kein Anlass, auf die positive Erörterung ethischer Problematik einzugehen; der Verfasser vermeidet das Problem. Nun wäre es aber auch nicht angebracht, einer positivistischen Behandlung keine Beachtung zu schenken, weil sie dieses zentrale Problem leugnet. Nicht nur dann, wenn das ethische Problem wirklich wissenschaftlicher Behandlung nicht zugänglich wäre, sondern auch dann, was grundsätzlich der Fall ist, bleibt ja die Fragestellung sinnvoll, was sich der unmittelbaren Beobachtung der gesellschaftswirtschaftlichen Vorgänge entnehmen lässt. Wenigstens grundsätzlich wäre ja die statistische Erfassung der Einkommensverteilung, der Einkommensverwendung in den einzelnen Schichten, der Dispositionsänderungen bei der technischen Entwicklung in den einzelnen Sektoren der Wirtschaft usw. möglich.

Der Verfasser ist mit Recht kritisch gegenüber dem grössten Teil der Ergebnisse der bisherigen Welfare Economics. Seine spezielle Untersuchung knüpft er im wesentlichen an die Frage, wie weit man grundsätzliche Entscheidungen darüber fällen könne, ob und in welchem Masse der Staat in den Ablauf der Volkswirtschaft eingreifen solle. Die gelegentlichen Argumente bei der Erörterung von Einzelfällen erscheinen ihm zu willkürlich. Im Zentrum des ersten Teiles steht die Erörterung über den «ideal output» und die Frage, ob und inwieweit die Konkurrenzwirtschaft als «Norm» angesehen werden könne. Im zweiten wird von den Kriterien ausgegangen, an denen entschieden werden soll, ob ein Zustand besser ist als ein anderer.

Bei der Erörterung der idealen Produktion wird zunächst an dem Modell der vereinfachten Marktwirtschaft die ideale Situation durch die Bedingung charakterisiert, dass das Indifferenzgebilde der Ophelimitäten der Gesellschaft das Transformationsgebilde der Produktion tangiert. Die Eindeutigkeit, ja die Möglichkeit der Lösung des Problems geht aber verloren, wenn man unter Fallenlassen gewisser vereinfachender Voraussetzungen die Probleme der Realität angeht. Dabei spielen dann eben die ausserökonomischen Momente eine entscheidende Rolle. In diesem Zusammenhange sei darauf hingewiesen, dass schon die ursprüngliche Verteilung der Güter und Fähigkeiten unter die konkurrierenden Individuen die Transformationsgebilde wesentlich beeinflussen. Es gibt dann kein Analogon zu der negativ geneigten und zum Ursprung konkaven Transformationskurve des zweidimensionalen Modells. Man kann da noch skeptischer sein als etwa Samuelson, auf den hingewiesen wird (S. 83, Anm. 2).

Eine besondere Rolle spielt bei der Erörterung die Frage, ob sich schneidende Indifferenzkurven als sinnvoll angesehen werden können. Der Verfasser hat mit Recht Bedenken. Meines Erachtens können sie nur auftreten, wenn die Frage erörtert wird, ob ein Zustand bei dem einen Präferenzprinzip einem anderen bei einem anderen Präferenzprinzip vorzuziehen ist. Aber damit kommt man dann zu der eingangs erwähnten Grundsatzfrage, die sicher nicht positivistisch zu lösen ist.

Bei der Erörterung der Kriterien für den Vergleich mehrerer Zustände ist davon auszugehen, dass faktisch die Präferenzprinzipien verschiedener Individuen sich widerstreiten können und sich faktisch auch stets widerstreiten. Entweder ist man dann auf ein überindividuales Wertkriterium angewiesen und kommt dann auf ethische Probleme, deren wissenschaftliche Behandlung ich nicht so negativ beurteilen möchte, oder aber man schiebt etwa die andere Frage unter, ob es Kriterien gebe, auf Grund deren sich entscheiden lässt, ob der Staat sich darauf verlassen kann, dass seine Bürger bei einer bestimmten Wirtschaftsgestaltung Ruhe geben werden oder sich im Rahmen der ihnen möglichen Willensäusserungen – legalen oder revolutionären – nicht oppositionell äussern werden.

Das ist sicher beim Pareto-Kriterium der Fall, wenn einige mehr bekommen und keiner weniger als im ursprünglichen Falle.

Bergsons Kriterium setzt eine gesellschaftliche Wohlfahrtsfunktion voraus und kann dann natürlich formal genau so formuliert werden wie die Maximumbedingung der individuellen Wohlfahrt oder Ophelimität. Aber damit ist das Entscheidende in die Voraussetzungen gelegt.

Kaldors Kriterium lässt den zweiten Zustand besser erscheinen als den ersten, wenn die Gewinner bei (2) die Verlierer bei (2) entschädigen können und dann nur einen Vorteil behalten. Genauere Untersuchung zeigt, dass dieses Kriterium Fälle zulässt, in denen gleichzeitig die eben formulierte Behauptung richtig ist wie auch die andere, die aus ihr entsteht, wenn man 1 und 2 vertauscht.

Scitovskys Kriterium engt die beim Kaldor-Kriterium entstehende Ungewissheitssphäre dadurch ein, dass es die Umkehrung ausdrücklich ausschliesst und verlangt, dass die Verlierer bei (2) nicht imstande sein sollen, die Gewinner durch Zahlung einer Entschädigung davon abhalten zu können, den Übergang von (1) zu (2) zu betreiben, ohne dass die Verlierer dann schlechter stünden als vorher.

Weitere Untersuchungen sind dann den Fragen gewidmet, wie es mit der Stabilität bei idealen und nicht idealen Zuständen steht und welche Bedeutung die Unvollständigkeit der Kenntnis des Gesamtzustandes bei den zur Entscheidung bestellten Einzelpersonen und dem Staate hat.

Die Arbeit klingt in einen Skeptizismus aus, ob die bisherige Konzeption der Welfare Economics eine Lösung der Probleme zulässt, die dem Nationalökonomen ein Anliegen sind. Der Skeptizismus ist nicht endgültig. Es bleibt zunächst die Frage offen, ob etwa eine neue Konzeption der Struktur gesellschaftlicher Modelle – wie sie etwa die Spieltheorie nahelegt – weiter kommen lässt. Und dann ist ja auch das Problem der Ethik noch nicht in die Analyse einbezogen.

Das Buch gibt in ausgezeichneter Weise den derzeitigen Stand der Welfare Economics wieder.

Universität Tübingen (Deutschland) HANS PETER

EDWARD HASTINGS CHAMBERLIN. *La théorie de la concurrence monopolistique.* Une nouvelle orientation de la théorie de la valeur. (Traduction de GUY TRANCART, préface par François Perroux.) Paris 1953. Presses Universitaires de France. XXVII, 338 p. fFr. 1200.

Die grosse Bedeutung, welche das 1933 in erster Auflage erschienene Werk von E. H. Chamberlin *The Theory of Monopolistic Competition* für die Entwicklung der ökonomischen Theorie erlangt hat, rechtfertigt seine Übersetzung in die französische Sprache in vollem Umfang und würde auch die Herausgabe einer deutschen Fassung als wünschbar erscheinen lassen. François Perroux gebührt das Verdienst, eine französische Ausgabe vorgenommen und diese mit einer geistreichen Einleitung ausgestattet zu haben.

Wer in der Vorstellung befangen war, dass das Wesen der von Chamberlin entdeckten «monopolistischen Konkurrenz», die wohl noch treffender als «Konkurrenz zwischen Monopolen» gekennzeichnet werden kann, darin bestehe, dass die auf dem Diagramm der Bildung des Monopolpreises eingezeichnete Nachfragekurve sich unter der Einwirkung anderer Firmen soweit nach links verschieben kann, bis sie die Kurve der Durchschnittskosten tangiert, wurde von Chamberlin in seinem wichtigen Beitrag «Monopolistic Competition Revisited»[1], der auch den Gegenstand verschiedener Gastvorlesungen an Europäischen Hochschulen im Jahre 1951 bildete, eines anderen belehrt. In diesem Aufsatz betont Chamberlin ausdrücklich, seine Theorie befasse sich nicht, wie häufig angenommen werde, mit einer einzelnen Marktform, noch mit gewissen Unvollkommenheiten des ökonomischen Systems, sondern sie stelle eine allgemeine Theorie dar, welche die Elemente des Monopols wie der Konkurrenz in gleicher Weise berücksichtige und berufen sei, die Ausgangsmodelle der reinen Konkurrenz von Marshall und Walras zu ersetzen. Die reine Konkurrenz sei dann nur noch ein Spezialfall, bei welcher das Monopolelement gleich null ist.

Man mag es bedauern, dass dieser in die Zukunft weisende Artikel Chamberlins nicht der französischen Ausgabe einverleibt wurde. Doch betont Perroux in seiner Einleitung nachdrücklich diese Bedeutung von Chamberlins Theorie. Er gebraucht den Ausdruck «révolution chamberlinienne» und stellt dem durch Variation eines Keynes-Wortes entstandenen Bonmot «Auf lange Sicht sind wir alle… Keynesianer» die Prognose gegenüber, wir seien auf lange Sicht alle Chamberlinianer. Ausdrücklich fasst er diese Entwicklung auf Grund von Chamberlins Theorie als eine Aufgabe der Nationalökonomie: «Encore son application aux domaines de l'échange international, des fluctuations, de la croissance, de la répartition, de l'emploi est-elle loin d'être aussi avancée qu'il conviendrait. Beaucoup de travail, et fort intense, reste à faire pour une assimilation critique et créatrice de l'intuition et des apports d'un grand économiste.» Die Ausgabe der hier angezeigten Übersetzung wird zweifellos die Bewältigung dieser Aufgabe fördern, indem sie es den im französischen Sprachbereich tätigen akademischen Lehrern erleichtert, Chamberlins Lehren auf Grund seines eigenen Textes mit den

1. *Economica*, 1951, S. 343 ff.

Studenten zu behandeln. Damit wird Chamberlins Theorie für künftige Generationen von Nationalökonomen französischer Sprache zum selbstverständlichen Besitz, womit eine wichtige Voraussetzung für deren Anwendung auf neue Probleme geschaffen ist.

Handels-Hochschule St. Gallen (Schweiz) W. A. JÖHR

DOROTHY W. DOUGLAS. *Transitional Economic Systems. The Polish-Czech Example.* London 1953. Routledge & Kegan Paul. VIII, 375 p. s. 25/-.

The chief significance of this volume lies in its detailed and painstaking account of the steps taken in the attempt to transform two of the leading East European countries into socialist economies. Although the change of economic systems, whether self-induced or deliberately undertaken by a country's government, differs from nation to nation, the experience gained in a specific case is very important and enlightening to other countries. This is particularly true at this time when conscious economic development is being studied, planned, and brought about in many parts of the world. The book is hence a very welcome contribution, particularly since it emphasizes the methods and techniques used in Eastern Europe and since comprehensive and reliable information about the economic revolution in those countries is hardly available in the West.

Postwar Eastern Europe offered a unique opportunity for observation of deliberate and centrally directed transformation of whole economies. From among the seven countries in question the author chose Poland, the largest of them, and Czechoslovakia, the industrially most advanced. She was well advised in devoting introductory chapters to a brief, instructive analysis of the prewar conditions in the two nations. For the changes that took place after 1945 and the policies that were adopted can be adequately understood only against the historic background of the two countries and against the long-run economic and political patterns of their development.

The main chapters of the volume deal with the early post-war period when, despite the urgent needs of reconstruction, the basic necessities of economic transformation were not ignored, with land reform, the nationalization of industry and the evolution of a planned economy in its effect upon production, labor, banking and international trade. These chapters make it very clear to what extent the establishment of a socialist planned society led in two structurally quite different countries in many respects to very similar developments qualified, however, by the traditions and institutions peculiar to each of them. Not only does the author stress the differences between the two countries in the transformation towards basically the same economic institutions, she also emphasizes the dissimilarities in the development of Poland and Czechoslovakia on one hand and the Soviet Union on the other. While the two East European nations profited greatly from the Soviet experience, they could not, and did not intend to, imitate the Soviet development in any close fashion. Poland and Czechoslovakia had not passed through a violent

revolution, as the Soviet Union did. They started in 1945 as multi-party states and intended to build economies meant to be transitional for a rather extended period. The author explains why, only after a few years, they came to the conclusion that the pace of socialist construction had to be accelerated.

The volume concentrates chiefly on the first five years of the Polish and Czechoslovakian post-war development describing in rich detail the issues of that period, the legislative and administrative steps taken by the two governments, and the progress made towards a socialist economy. While evaluation is not missing in many places, no attempt is made of an overall appraisal of the great experiment in the two East European countries. This, I feel, was a wise decision since even the initial stages in their history-making transformation were not completed when the material for the volume was collected. The fact that the development has meanwhile advanced far beyond its stage at that time in no way diminishes the significance of the volume; its detailed record of the early and most difficult years of socialist construction should be of real value to all earnest students of "economic development", the allegedly newest branch of economics.

New York University OTTO NATHAN

Enterprise and Secular Change: Readings in Economic History. Edited for the American Economic Association and the Economic History Association by FREDERIC C. LANE, Editor, and JELLE C. RIEMERSMA, Associate Editor. London 1953. Allen and Unwin. XI, 556 p. s. 32/-.

The purposes of this volume, as stated by Professor Lane in the Preface, are to acquaint economists, sociologists and general historians with "some of the problems and achievements of economic history", and to show young scholars "some of the aims, methods and results of other investigators". In trying to accomplish these broad purposes the editors faced a major, possibly an insoluble dilemma. They wanted to illustrate the diversity of problems and sources dealt with and the methods used by economic historians, but at the same time to have enough selections "dealing with the same problem, or set of related problems to show what advances have been made since economic history became an independent discipline in the 1890's".

The Editors' plan was to limit selections to essays dealing with business units, money and prices, and method. Without making a survey of the field as extensive as that of the editors and the advisory committee set-up by the Economic History Association, it is impossible to say that any other selection of three general topics would have yielded better results. It can be said, however, that these three provide more examples of diversity in problems and sources than chronological advances in the scholarship of economic history.

For example although business units appear in the discussions there seems little comparability that could indicate an advance between the work of Gustav

Schmoller or Werner Sombart which open Section I, and that of Gardner C. Means or Leland H. Jenks which appear near the end of the section. Similarly in Section II the contrast between Eli F. Heckscher and Norman J. Silberling who contribute the earliest writing, 1924 and 1930/31, respectively, and Sir John Clapham and Charles Wilson, 1945 and 1949, who are the most recent writers, is one in materials and problems rather than increasing sophistication of understanding.

Another effect of the three topic basis of selection is the exclusion of many of the leading scholars of the field such as Ashley, Pirenne, or Tawney. By striving for a degree of unity the editors had to forego selection of writing that did not fit, regardless of how important it may have been in the development of economic history.

These criticisms, however, show the difficulty of the editors' task within the limits of a single volume, and are not meant to detract from the value of the essays. Each specialist in the field will wish that some other articles had been chosen but he will probably not contend strongly that any of the present ones should be eliminated.

Two diverse omissions call for special mention. None of the first group of American economic historians except Edwin F. Gay are included, and Gay's article is not on American history as such. Some example of the work of men like Callender, Dewey, Clark, Bullock, or Ripley might not only have indicated to foreign readers that the economic history of the United States was being intensively studied by the turn of the century, but also have allowed for rather striking contrasts in method. The other omission is that of the economic historian whose influence has been greatest in the world of affairs: Karl Marx. Since part of the writing of several of the men included was directly inspired by efforts to refute or modify Marx, it would seem appropriate to give the younger scholar a chance to see both the weaknesses and strengths of the Marxian approach.

The third section devoted to method deliberately emphasizes diversity. After essays by Gay and Clapham which probably represent the generally held views of British and American economic historians, and an able defense of the place of theory in history by Heckscher, Francois Simiand and Arthur Spiethoff are selected as representative of extreme points of view. Spiethoff saw economic and social phenomena as parts of indivisible wholes or *Gestaltes*, which have styles and representative types. Simiand on the other hand worked by separating out from the whole the elements or indices to be examined. A follower of Emil Durkheim, he represented the twentieth century version of French positivism. In the ease of both these writers, the introductions to their work by the editors may prove more useful than the essays themselves.

The section ends with a long selection from Marc Bloch on the value of comparative study, and an excellent conclusion by Frederic C. Lane. Since members of the present generation of American economic historians have not written much on method, the Lane essay not only pulls the sections together, but fills a gap in the book.

One cannot expect to cover a field in a single book of readings. It is enough

that the reader be intrigued, exasperated or otherwise provoked to go further. This function is well performed by the Lane and Riemersma volume. The essays are interesting and stimulating. They represent extremes in materials and methods, and they illustrate some of the best writing on economic history.

University of Pennsylvania, Philadelphia, Pa. (U.S.A.) THOMAS C. COCHRAN

Die Entwicklung der Kriegswaffe und ihr Zusammenhang mit der Sozialordnung. Mit Beiträgen von WILHELM E. MÜHLMANN, PAUL STOTTEN und JOHANNES VOLKMANN, herausgegeben von LEOPOLD v. WIESE. Köln 1953. Kölner Universitäts-Verlag. 156 S. DM 9.80.

Es öffnen sich sehr weite Ausblicke, und es wäre eine unbillige Forderung, sie alle in einem schmalen Band von 150 Seiten bis zur vollen Greifbarkeit ausgedeutet zu erwarten. In der Tat kann es sich, wie der Herausgeber feststellt, «nur um einen ersten Schritt zu einer tieferdringenden soziologischen Behandlung handeln». Dieser Schritt ist an sich schon verdienstlich, durch das, was er zeigt, anregt und unbefriedigt lässt. Der Begriff «Kriegswaffe» ist hier nicht etwa als ein Kollektiv für die Wehrinstitution eines Staates, sondern ganz real für die von der Technik gebotenen Hilfen der Kriegführung gebraucht. Die Waffenentwicklung steht im Mittelpunkt, wobei denn freilich der immer selbstverständliche Übergang von der Waffe als einem Instrument zu der Waffe im militärorganisatorischen Sinne, als einer von Menschen repräsentierten Waffengattung, je und je seine gebührende Beachtung erfährt.

In welcher Art hat Notwendigkeit und Wille zur Bewaffnung auf die gesellschaftlichen Verhältnisse und die gesellschaftliche Schichtung der Völker sich ausgewirkt? In welcher Beziehung stehen die militär- und waffentechnischen Neuerungen zu der inneren Ordnung und zu dem sozialen Fühlen der Gemeinschaften? Eine Fülle von Entwicklungslinien und von Problemen drängt sich zu: wir sehen, als eines von vielen, etwa den Funktionswandel der Waffe vom Gebrauchs- zum Prunk- und Paradestück und weiterhin zum Hoheitssymbol und zum Kultzeichen (S. 45). Es sind Fortgänge, die vom militärischen wie vom soziologischen Gesichtspunkt aus gleiches Interesse wecken, wobei der letztere, als der jüngere, den Vorzug der grösseren Unbefangenheit für sich haben dürfte, während auf dem militärischen Felde die Auseinandersetzung mit der überkommenen Deutung gelegentlich der freien Anschauung etwas im Wege stehen mag – so vielleicht in der Wertung des Streitwagens, weil er innerhalb der eigentlichen Kriegsgeschichte keine einprägsame Rolle spielt und seine scheinbare Wiederkehr im 20. Jahrhundert in der Verfolgung einer ganz anderen Linie geschieht.

Bei allem ist es gegeben, dass das Hauptgewicht auf den Anfängen liegt; denn hier heben die Zusammenhänge in der Ausgangslage und im Fortschreiten am eindrücklichsten sich heraus. Es ist auch nur hier in knapper Umspannung eine doch annähernd allseitige Erfassung möglich. Später entgleitet das alles dem Un-

gemessenen zu; die Gefahr eines nur oberflächlichen Registrierens drängt sich vor und ist auch im vorliegenden nicht ganz überwunden worden. Und so ist es gewiss zu einem Teil dem vermehrten Widerstand der Materie zur Last zu legen, wenn uns die letzten zwei Teile, die Wandlungen des Gebrauchs der Kriegswaffen im Mittelalter und in der neueren Zeit behandelnd, nicht im gleichen Masse ansprechen wollen wie die beiden sehr bereichernden Kapitel, welche die primitive Waffentechnik und die Waffe in der Antike zum Gegenstand haben.

In einem Werke, das mehrere Mitarbeiter vereinigt, wird man die Unterschiedlichkeit der Betrachtungs- und Darstellungsweise als erfrischend begrüssen. Hier geht uns der Gegensatz von der schlicht sachlichen Darbietung der Abschnitte Naturvölker und Antike zu dem etwas forciert unterhaltsamen Stil der anderen Kapitel doch zu weit. Was soll man dazu sagen, wenn es bei den mittelalterlichen Schutzwaffen heisst: «Jetzt sieht man solche Rüstungen allenfalls auf Maskenbällen, wo fauler Witz Konservenöffner dafür als nötig erklärt. Denn mit dem Aufkommen der Feuerwaffen verlor der Panzer mehr und mehr seinen Sinn» (S. 16)? Oder wenn wir Seite 147 lesen: «An die Stelle von zweierlei Tuch, der bewährten Angriffswaffe gegen Frauenherzen, traten Feldgrau und Khaki, bis schliesslich die Uniform wirklich allerwärts uni-form wurde, ein Sinnbild der Verbrüderung, die alle Kriegswaffen zu altem Eisen machen sollte. Aber 1939 nahte!»?

Einige Versehen wird der Leser selber bereinigen, so etwa die 2300 Jahre, die zwischen der Rabenschlacht und den Kämpfen im Tirol liegen sollen (S. 11) oder die «Magdeburger Zaubersprüche» (S. 26). Dem Begriff Urfehde wird man mit der Gleichung «ewiger Frieden» (S. 131) kaum gerecht. Die preussischen Verluste von 1866 werden (S. 19) mit «etwa 6000, davon mehrere tausend durch Cholera» angegeben; das preussische Generalstabswerk (1867) nennt 4450 Gefallene, 6427 der Cholera oder andern Krankheiten Erlegene.

Wir haben ein paar Schönheitsfehler hervorgehoben, um abschliessend nachdrücklicher zu betonen, dass dem Leser, wenn er mit einiger Kritik geniesst, viel Gewinn wartet, dass das Buch nach Anlage und Ausführung beachtlich ist und dass mancher Ansatz zu künftigem bedeutendem Ausbau hier ruht.

Bolligen bei Bern (Schweiz) EDGAR SCHUMACHER

R. G. HAWTREY. *Towards the Rescue of Sterling*. London 1954. Longmans, Green and Co. x, 159 p. s. 12/6.

Wie der Titel des Buches andeutet, versucht der Autor in dieser neuesten seiner langen Liste von Veröffentlichungen Antwort auf die Frage nach den Massnahmen zu geben, die notwendig sind, um das Pfund Sterling intern und extern in ein Gleichgewicht zu bringen und damit die Voraussetzung für ein neuerliches, erfolgreiches Konvertibilitätsexperiment zu schaffen.

Hawtreys Buch lässt sich in zwei Hauptabschnitte unterteilen. Im ersten analysiert er die Ereignisse von 1946 bis 1952, wobei der Darstellung der kurzen

Konvertibilitätsphase vom Jahre 1947 und der Abwertung zwei Jahre später besonderes Gewicht zukommt. Hier findet sich auch das für die späteren Ausführungen des Autors wichtige Kapitel über die Kreditpolitik. Im Vergleich zu den früheren Veröffentlichungen Hawtreys bringt dieser Abschnitt allerdings nichts Neues. Nach wie vor versteht der Autor unter Kreditpolitik praktisch ausschliesslich Veränderungen der Bankrate.

Im zweiten Teil wendet sich Hawtrey der heutigen Situation des Pfundes zu, die dadurch charakterisiert werden kann, dass in Grossbritannien seit Jahren ein konstanter inflatorischer Druck herrscht. Die Regierung hat es nicht nur unterlassen, mittels der Kredit- und Fiskalpolitik das interne «excess spending» zum Stillstand zu bringen, sondern ermöglichte im Gegenteil die dafür unentbehrliche ständige Versorgung des Marktes mit neu geschaffenem Geld. Solange hier nicht Abhilfe geschaffen werde, folgert der Autor, könne jede Lockerung der quantitativen Restriktionen notgedrungen bloss von vorübergehender Dauer sein.

Aus dem bisher Gesagten ergibt sich, dass Hawtrey zur Beseitigung des inflatorischen Druckes in erster Linie «teureres Geld» empfiehlt. Die Bankrate ist hinaufzusetzen. Dies würde zwar aller Voraussicht nach zu einem Steigen der Arbeitslosenzahl führen. Darin sei jedoch kein Nachteil zu erblicken, solange die Arbeitslosigkeit unter dem Niveau, das man vernünftigerweise als «normal» bezeichnen könne, liege (S. 127). Neben dem Anziehen der Zinsschraube empfehlen sich auftriebshemmende Modifikationen der Steuerpolitik. Sowohl bei den Kapitalgüterindustrien (aus Exportrücksichten) wie beim Staatsbudget (Aufrüstung) lassen sich allerdings nicht wesentliche Abstriche vornehmen. Somit bleibt einzig der Konsumsektor, der durch geeignete steuerliche Massnahmen beschnitten werden soll. Hawtreys Vorschläge laufen somit auf eine neuerliche «Austerity»-Politik hinaus (S. 142).

Dazu kommt ein weiterer Faktor. Hawtrey ist der Ansicht, dass das Pfund gegenüber dem Dollar unterbewertet sei. Die Gründe sieht er in der zu starken Abwertung vom Jahre 1949: "The effect of the excessive devaluation was so to lower the prices of exports that the favourable effect normally to be expected from a depreciation of the money unit on the balance of payments was nullified by the fall in the total dollar value of their proceeds" (S. 123). Diese Unterbewertung wirkt an sich schon in der Richtung der Überbeschäftigung der britischen Exportindustrien, wobei die Diskrepanz zwischen den tatsächlich geltenden (festen) und den «richtigen» Wechselkursen durch die Politik des teuren Geldes noch vergrössert würde. Neben der «tight credit policy» befürwortet Hawtrey daher eine Aufwertung des Pfundes, wobei gleichzeitig vom System des starren Kurses abzugehen wäre. An seine Stelle müsste eine «floating rate», analog der Periode 1931–1939, treten (S. 117). Erst wenn diese beiden Bedingungen erfüllt sind – Deflationspolitik und Freigabe des Pfundkurses –, so argumentiert der Autor, wird von einem Gleichgewicht im Innern wie gegen aussen gesprochen werden können.

Handels-Hochschule St. Gallen (Schweiz) FRANZ LÜTOLF

Die Konvertibilität der europäischen Währungen. Erlenbach-Zurich et Stuttgart, 1954. Eugen Rentsch Verlag. 331 p., sfr. 11.65, toile sfr. 15.10.

Sous l'égide du «Schweizerisches Institut für Auslandforschung», M. Albert Hunold vient de publier, en hommage à M. Luigi Einaudi, «maître vénérable de l'économie politique, libérateur de l'économie et président de la République italienne», à l'occasion du 80e anniversaire de celui-ci, un ouvrage qui réunit des contributions d'économistes de divers pays, à savoir MM. G. Haberler, P. Jacobsson, W. Röpke, G. Carli, F. Collin, H. Germain-Martin, H. Homberger, J. E. Meade, F. W. Meyer, S. Posthuma, F. A. Lutz, sur le thème commun de la restauration de la convertibilité.

En dépit de la qualité exceptionnelle de ces études et de l'attachement déclaré de leurs auteurs à l'objectif de la convertibilité, il n'est pas certain que ce livre persuade les gouvernements d'atteindre ce dernier dans les plus brefs délais. Car on ne peut manquer d'être frappé par la divergence des opinions qui y sont exprimées, d'autant plus que tous ceux qui ont collaboré ont cependant entre eux des affinités théoriques et doctrinales évidentes. Il y a peu d'années encore, quand la convertibilité n'apparaissait que sous la forme vague d'une aspiration lointaine, on avait le sentiment que les controverses ne roulaient guère que sur les moyens propres à assurer l'équilibre des balances des paiements. Mais depuis que la restauration de la convertibilité est devenue un problème d'actualité, on s'aperçoit que les esprits feignent de se séparer sur sa signification même. Et c'est peut-être le paradoxe de cette publication que de poser plus de problèmes qu'elle n'en résout.

Quant à la nature du but, le débat porte sur la distinction, et partant le choix, entre la convertibilité externe et la convertibilité interne, la seconde étant définie comme le droit accordé aux résidents de se procurer pour leurs achats ou leurs placements extérieurs les devises étrangères de leur choix avec leur monnaie nationale, et la première comme la faculté offerte aux non-résidents de transformer en or ou en dollars les avoirs en la monnaie nationale qu'ils peuvent détenir. Pour corser la complication, chacune des deux formules comporte une série impressionnante de variantes, selon que le droit ou la faculté susmentionnés sont ouverts plus ou moins largement.

Pour certains, comme M. Röpke, la convertibilité externe n'est qu'une illusion, car si dans chaque pays les résidents ne sont pas plus libres qu'auparavant d'exercer leur pouvoir d'achat à l'étranger, rien n'est modifié en réalité. Avec M. Lutz la plupart semblent prêts cependant à reconnaître à la convertibilité externe, en elle-même, le mérite de rendre sans objet la discrimination dans les rapports mutuels des pays qui l'auront établie. Leurs yeux se tournent naturellement vers la livre sterling. Il se trouve qu'à leur attente souvent impatiente M. Meade répond par une grande prudence, motivée surtout par la crainte que, cas échéant, un usage trop étendu de la convertibilité externe du sterling n'ait pour effet d'obliger les autorités de la zone du même nom à réduire ses importations en provenance de la zone dollar, avec la conséquence ultime de compromettre la

productivité ou le développement des économies très diverses qui font partie du *commonwealth*.

L'accord ne se fait que sur la constatation que la convertibilité externe est incompatible avec l'U.E.P. Mais c'est alors l'occasion pour quelques-uns de trouver que la disparition de cette dernière est un prix trop élevé pour une solution de substitution, qui comporte certes la promesse d'être plus étendue mais qui ne pourra peut-être pas la tenir.

Ceux qui recommandent d'accorder la priorité à la convertibilité interne font valoir que seule elle permet de bénéficier des bienfaits de la division internationale du travail. Mais M. Lutz observe que la convertibilité interne d'un pays exige logiquement la convertibilité externe des autres pour mettre le premier à même d'utiliser pour le règlement de ses déficits envers des pays à monnaie convertible ses excédents partiels sur des pays à monnaie inconvertible. M. Posthuma ajoute que ce risque lui paraît une certitude parce qu'un pays à convertibilité interne est appelé à réexporter vers des pays à monnaie inconvertible des produits en provenance de la zone dollar. Quant à M. Homberger, il remarque finement que le mieux peut être l'ennemi du bien en ce sens qu'un pays qui pousserait la convertibilité interne à ses dernières extrémités deviendrait le jouet de la politique commerciale de ses partenaires moins avancés dans cette voie.

Sans doute les divergences sembleraient-elles moins fortes si au lieu d'insister préalablement sur les avantages et les inconvénients respectifs des deux types de convertibilité, on discutait simultanément des moyens d'y parvenir. On s'aperçoit alors, en effet, que les partisans de la convertibilité externe estiment que celle-ci n'est viable que pour autant qu'il existe certaines règles de bonne conduite commerciale qui évitent à tout pays revenu à la convertibilité externe d'être dépouillé de ses réserves monétaires soit par les pays à monnaie inconvertible, soit même par ses congénères. Obéissant à la même préoccupation, mais prenant la difficulté par l'autre bout, M. Meade fait, en songeant à la zone sterling, la suggestion originale de régler l'ampleur de cette convertibilité externe en la faisant jouer exclusivement pour l'achat d'un nombre plus ou moins grand de matières premières.

De l'autre côté les champions de la convertibilité interne répondent partiellement à l'objection précitée de M. Lutz en prônant l'adoption de la solution dite suisse. Reste à savoir si cette extension progressive du cercle de la convertibilité externe serait aisée. Ne risque-t-on pas de se trouver à un moment donné entre deux chaises, le nombre de pays à convertibilité externe n'étant pas encore suffisant pour qu'un équilibre multilatéral puisse s'établir commodément entre eux, et celui des pays à monnaie inconvertible étant encore trop important pour qu'on puisse les abandonner d'un cœur léger à l'enfer du bilatéralisme.

Il semble bien qu'en remontant, après les méthodes de la restauration de la convertibilité, jusqu'aux mécanismes régulateurs de l'équilibre des balances, on s'approche encore plus de la lumière. Car après tout, si les gouvernements hésitent tant à rétablir la convertibilité, c'est qu'ils n'ont pas, à tort ou à raison, une confiance absolue dans ces mécanismes. Mais si l'unanimité des esprits doit pouvoir se faire sur l'importance primordiale de ce problème des régulateurs, il faut ajouter aussitôt qu'ils s'opposent violemment dès qu'il s'agit de l'efficacité de ces derniers.

C'est ainsi qu'à l'endroit des cours de change on retrouve dans l'ouvrage les controverses habituelles entre partisans et adversaires de la flexibilité. Et les souvenirs d'entre-deux-guerres qu'évoquent irrésistiblement ces contestations traditionnelles rappellent utilement qu'il est parfois plus difficile de maintenir la convertibilité que de l'établir.

Université de Genève (Suisse) JACQUES A. L'HUILLIER

ANTON TAUTSCHER. *Die öffentliche Wirtschaft.* Berlin 1953. Duncker & Humblot. XVI, 399 S. DM 24.80.

Es gibt in deutscher Sprache so viele gute Lehrbücher der Finanzwissenschaft, dass ein Autor einen ganz besondern Grund haben muss, um ein neues zu publizieren. Dieser Grund sollte natürlich der sein, dass er glaubt, eine Arbeit schreiben zu können, die besser ist als die seiner Vorgänger. Hat Tautscher diesen Ehrgeiz gehabt, so hat er ihn leider nicht verwirklichen können. Sein Buch hat alle die Verdienste, die schon seit der Zeit der Kameralisten so typisch für die deutschen finanztheoretischen Arbeiten sind: Gründliche Sachkenntnis und ausführliche Systematik. Aber es hat auch den üblichen Fehler, dass es nicht in genügendem Masse auf eine realistische Diskussion der wirtschaftlichen Probleme – vor allem die Frage der Steuerüberwälzung und Budgetpolitik – eingeht, sondern sich allzu sehr mit Definitionen und Systematik begnügt.

Ich will hier nur ein Beispiel anführen, nämlich die Behandlung der Frage der Besteuerung eines Monopols, die bekanntlich in jedem Fall von theoretischem Gesichtspunkt aus eine besonders elegante und fruchtbare Analyse möglich macht. Tautschers Darstellung auf S. 274 ist so knapp, dass sie in ihrer Gesamtheit zitiert werden kann: «Werden Monopolisten mit Steuern getroffen, die ihre Güterpreise belasten, so ergeben sich, wenn der Monopolist die bisherigen Preissätze gemäss dem Cournotschen Punkt erstellt, zwei Möglichkeiten. *Der Monopolist wird die Steuerlast selbst* tragen, wenn die durch die Steuerüberwälzung erwirkte Preissteigerung die *Absatzmenge so weit vermindert*, dass der *Verlust durch die Überwälzung grösser ist als die Kosten des Selbsttragens der Steuerlast.* Wird durch die Steuerlast der Gewinn verringert, dieser aber durch eine Preissenkung zum Teil oder ganz aufgeholt, so erzwingt die Steuer eine *Senkung des Monopolpreises*, weil durch gesenkte Preise die Umsatzmenge steigt. *Der Monopolist trägt die Steuer und holt sie durch Umsatzsteigerung mittels Preissenkung seiner Güter ein.*» Wie ersichtlich, reine Banalitäten! Im Literaturverzeichnis zu diesem Abschnitt wird ausschliesslich deutschsprachige Literatur erwähnt. Nicht einmal Seligman und Edgeworth werden hier genannt.

Tautscher ist stark beeinflusst von W. Andreaes «organischer» Staatswirtschaftslehre. Dies hat dazu geführt, dass er eine grosse Anzahl von Prinzipien, Aufgaben, Zielen und Zwecken systematisiert. Hierin liegt die Gefahr, dass der Leser nicht immer weiss, ob der Verfasser beabsichtigt, zu beschreiben wie ein Staatshaushalt wirklich arbeitet oder ob er angibt wie er seiner Meinung nach

arbeiten sollte. Wir können uns auch hier mit einem Beispiel begnügen (S. 63): «*Das Organisationsziel der Wirtschaftspolitik des Staates ist: die Vollbeschäftigung für alle Produktionsfaktoren und -elemente anzustreben.* Parallel dem Bestreben nach Vollbeschäftigung geht das, aus den gegebenen und noch aktuierbaren Produktivkräften den grössten Ertrag zu erwirken. Damit übernimmt der Staat als volkswirtschaftliches Organisationsziel, die private Wirtschaft zu veranlassen, die Steigerung der Produktivkräfte so zu forcieren, dass stets das *maximale Sozialprodukt* hervorgebracht werden kann. Denn es ist klar, dass der sozialbedingten Einkommensordnung nur dann entsprochen werden kann, wenn das zu verteilende Sozialprodukt den grösstmöglichen Umfang hat. *Als Organisationsziel der staatlichen Wirtschaftspolitik gilt: die Maximierung des Sozialproduktes anzustreben.*»

Um zu zeigen, dass Vollbeschäftigung und maximales Sozialprodukt nicht notwendigerweise das vorherrschende Ziel für die Wirtschaftspolitik des Staates zu sein brauchen, kann es genügen, daran zu erinnern, dass man vor die Wahl zwischen Vollbeschäftigung und stabilem Geldwert gestellt werden kann und dann das letztere vorzieht, oder dass der Staat, in der Absicht das Land gegen Blockade zu sichern, während eines Krieges zu einer an und für sich unwirtschaftlichen Anwendung der Produktionsfaktoren anregen kann.

Universität Lund (Schweden) CARSTEN WELINDER

Wirtschaft ohne Wunder. Schweizerisches Institut für Auslandforschung, Volkswirtschaftliche Studien, hg. von Albert Hunold. Erlenbach-Zürich 1953. Eugen Rentsch Verlag. 359 S. sFr. 15.40.

Die Abteilung für volkswirtschaftliche Studien des Schweizerischen Instituts für Auslandforschung legt in diesem Werk eine Sammlung von Vorträgen und Aufsätzen vor, die weitgehend dem gleichen Problemkreis gewidmet sind. *Wirtschaft ohne Wunder* will nach dem Geleitwort eine Würdigung der Leistungen der Marktwirtschaft auf Grund konkreter Experimente darstellen. Diese konkreten Experimente werden vor allem am Beispiel Westdeutschlands untersucht, dessen Wiederherstellung einer marktwirtschaftlichen Ordnung sich im Zeitpunkt der Buchveröffentlichung zum fünften Male jährte. Dabei möchte der etwas herausfordernde Titel den Umstand unterstreichen, dass der stürmische Wiederaufstieg der westdeutschen Wirtschaft nichts anderes als das Anwendungsergebnis «einfacher und erprobter Grundsätze» darstellt.

Die Beiträge – sie sind zwar nicht alle von gleichem Niveau – stammen von Autoren, die der neoliberalen Richtung der Nationalökonomie verpflichtet sind und die daher besonders stark am marktwirtschaftlichen Experiment Westdeutschlands Anteil nehmen. Dieses Moment gibt dem Buch eine gewisse Frische und Durchschlagskraft der Auseinandersetzung; anderseits empfindet man an dem Werk eine gewisse Einseitigkeit der Darstellung und teilweise ein Mangel an theoretischer Differenzierung bei der Diskussion wirtschaftspolitischer Probleme.

Den ersten Teil des Buches, *Allgemeine Grundlagen*, eröffnet LUIGI EINAUDI mit einem weisen Beitrag über Sparen und Investieren, in welchem er zu Recht einer vermehrten Achtung vor dem privaten Sparen und dem staatlichen Schutz dieses Sparkapitals das Wort redet. F. A. HAYEKS Aufsatz, der sich mit der Entwicklung des Rechtsstaatsideales befasst, bewegt sich allerdings sehr am Rande der Themastellung des Buches, lässt den Autor aber erneut als einen ausgezeichneten Kenner der Geistesgeschichte erscheinen. Sehr im Zentrum der Auseinandersetzungen steht hingegen WILHELM RÖPKES vehement geschriebener Beitrag; glaubt er doch, anhand des westdeutschen Experimentes die Überlegenheit einer sogenannten «alten» gegenüber einer «neuen» (von Keynes beeinflussten) Ökonomie eindeutig nachweisen zu können. Man frägt sich nur, ob Röpke auch hier nicht weitgehend eine Attacke gegen Windmühlen reitet. Denn das so sehr zerstörte Westdeutschland mit der Notwendigkeit seines raschen Wiederaufbaues dürfte kaum das geeignete Beispiel sein, um die Richtigkeit Keynesscher Gedankengänge zu diskutieren, ob unter bestimmten Voraussetzungen die private Investitionstätigkeit zurückgehe und sich daher gewisse staatliche Vollbeschäftigungsmassnahmen aufdrängen können. Und auch eine eingehendere Begegnung mit der «angelsächsischen Nationalökonomie» und dem Studienbetrieb an amerikanischen Universitäten hat dem Rezensenten gezeigt, dass die nationalökonomische Forschung – von deren Beschäftigung mit andern Problemen ganz abgesehen – so sehr um eine Synthese der klassischen und der Keynesschen Theorie bemüht ist, dass Röpke eher ein Zerrbild des gegenwärtigen Forschungsstandes gibt, wenn er schreibt, dass «die Nationalökonomie in zwei anscheinend unversöhnliche, ja kaum mehr eine echte Diskussion pflegende Lager zerrissen ist». ALEXANDER RÜSTOW beschliesst den ersten Teil des Buches mit einer kurzen Studie über «Soziale Marktwirtschaft als Gegenprogramm gegen Kommunismus und Bolschewismus», worin er vor allem seine schon früher erhobene Forderung nach einer Erweiterung der Sozialpolitik zu einer umfassenden Vitalpolitik wiederholt.

Im zweiten Teil, *Praktische Gestaltung*, berichtet zunächst FERNAND BAUDHUIN vom marktwirtschaftlichen Experiment Belgiens in den Jahren 1945 bis 1952 und den dabei erzielten Ergebnissen. LUDWIG ERHARD liefert einen höchst temperamentvollen Beitrag über «Die deutsche Wirtschaftspolitik im Blickfeld europäischer Politik», wobei seine entschiedene Bejahung der europäischen Integrationspläne zeigt, wie sehr er als Politiker sich der Bedeutung des soziologisch-institutionellen Rahmens bewusst ist, in welchem auch die Verwirklichung einer marktwirtschaftlichen Ordnung zu erfolgen hat. HARRY D. GIDEONSE charakterisiert einige Grundzüge der amerikanischen Wettbewerbspolitik, muss allerdings einräumen, dass die verwirrende Fülle der wirtschaftspolitischen Massnahmen in den USA eine durchgängige Verfolgung liberaler Grundsätze nicht immer deutlich sichtbar werden lässt. FRANZ NEMSCHAK setzt sich mit den «Ordnungsprinzipien der Wirtschaftspolitik Österreichs» auseinander. Wie sehr der von ihm in der konkreten österreichischen Situation bejahte «dritte Weg» den wirtschaftspolitischen Forderungen des Neoliberalismus entspricht, bleibe jedoch dahingestellt. JACQUES RUEFF schliesst diese Gruppe von Beiträgen ab mit einem Aufsatz, worin

er eine, vielleicht allzu vereinfachende «natürliche Erklärung» für das Wirtschaftswunder Westdeutschlands versucht.

PAOLO BAFFI eröffnet den dritten Teil, *Einzelprobleme*, mit einer ausgezeichneten Studie «Betrachtungen zur jüngsten Währungspolitik in Deutschland und Italien», an die sich eine sehr übersichtliche Darstellung der Neugestaltung des deutschen Aussenhandels nach dem zweiten Weltkrieg aus der Feder von FRITZ W. MEYER schliesst. CARLO MÖTTELI geht in seinem Aufsatz «Gewerkschaften und Wirtschaftsordnung» den Gründen nach, warum auch auf gewerkschaftlicher Seite der Wert einer marktwirtschaftlichen Ordnung immer mehr anerkannt wird, während RUDOLF MÜLLER nochmals in knapper Form die riesigen Schwierigkeiten der allerersten Nachkriegsjahre lebendig werden lässt, welche die westdeutsche Wirtschaft zu überwinden hatte. VOLKMAR MUTHESIUS würde gerne «Westdeutschlands monetäre Schlackenreste» möglichst bald beseitigen, wobei man allerdings lieber mehr von einzelnen Zusammenhängen auf dem deutschen Geld- und Kapitalmarkt, dafür etwas weniger von der Person des Wirtschaftsministers der westdeutschen Bundesrepublik vernommen hätte. ERICH WELTER beschliesst das Sammelwerk mit einem Aufsatz über «Die wirtschaftspolitische Bildungsaufgabe», in welchem er sich für ein Denken in ordnungspolitischen Zusammenhängen einsetzt und vor allem auch von den Nationalökonomen eine vermehrte theoretische Betrachtung der Probleme fordert.

Und es ist gerade diese Forderung von Welter nach vertieftem theoretischem Forschen, die man bei einzelnen Vertretern der neoliberalen Richtung der Nationalökonomie in teilweise noch erhöhtem Masse verwirklicht sehen möchte. Denn der grosse Erfolg des westdeutschen Experimentes darf nicht vergessen lassen, dass unter verschieden gearteten Voraussetzungen in einer Marktwirtschaft andere Probleme auftreten können, für deren Bewältigung die Theorie die Rüstzeuge ebenfalls bereithalten muss. Eine Erweiterung der theoretischen Forschung wird auch den vermeintlichen tiefen Riss zwischen «alter und neuer Ökonomie» wohl immer mehr zum Verschwinden bringen. Die Unterscheidung dürfte dann viel eher in jener Richtung verlaufen, dass es – um einen Ausspruch Schumpeters zu zitieren – letzten Endes nur gute oder schlechte Ökonomen gibt.

Handels-Hochschule St. Gallen (Schweiz) JOSUA WERNER

HERMAN WOLD (in association with Lars Jureen). *Demand Analysis: A Study in Econometrics*. Almquist & Wiksell, Stockholm/John Wiley & Sons, New York, 1952. XVI, 358 p.

Statistical estimation of demand functions has been the major focus of the development of quantitative economics over the last half century. Problems of demand analysis have been the occasion for general methodological innovations and controversies. Until recently these developments have been accessible only in fragmentary and scattered form. Now, fortunately both for the specialist and for the general economist, a number of integrated expositions of the present state of

econometrics, and in particular of statistical demand analysis, are appearing. (We may mention, in addition to the volume under review, J. TINBERGEN, *Econometrics*, Philadelphia 1951; G. TINTNER, *Econometrics*, New York 1952; T. KOOPMANS, ed., *Statistical Inference in Dynamic Economic Models*, New York 1950; R. STONE, *The Measurement of Consumers' Expenditures and Behaviour in the United Kingdom 1920–1938*, Vol. I, Cambridge 1954.) Herman Wold's *Demand Analysis* is a very significant contribution to this literature, indispensable for serious scholars in the field and extremely useful for students at all levels. It is welcome not only for its intrinsic merits but for the methodological approach it espouses and for the empirical results it reports. The growth of econometrics has uncovered more problems than solutions, and it is important to have before us the diversity of hypotheses, techniques, and empirical experience of investigators all over the world.

Demand Analysis is essentially a report of the author's researches and views in a number of fields: (1) Econometric method (chapter 2), (2) Pure theory of consumer demand (part II), (3) Statistical theory: random processes (part III), and regression (chapters 12/13), (4) Methods and results of statistical demand analysis of Swedish family budget data and aggregate time series (chapters 14–18). These topics are expounded at varying levels of sophistication, difficulty, and detail. But the reader who finds (2) and (3) hard going will find their conclusions clearly summarized in part 1. He may, however, be disappointed that the refinements of economic theory, econometric method, and statistical theory to which the major part of the book is devoted play so little part in the empirical investigations of the final chapters. This discrepancy between theoretical and methodological refinement and empirical practice is not peculiar to this book but symptomatic of the general state of econometrics. But it is a problem that calls for more of Wold's energy and ingenuity than he has here given it.

(1) In chapter 2, Wold gives a spirited defense of the usefulness of least-squares regression for the non-experimental data of economics. His main antagonist is the Cowles Commission, which has attacked least-squares estimation of individual "structural" equations and urged alternative estimation techniques based on a view of the economy as a system of simultaneous equations. (Cf. KOOPMANS, *op. cit.*) Wold argues for setting up economic models as "recursive" sets of equations representing chains of causation. In such a model each variable has, unambiguously, one set of other variables as causes and another, completely distinct, set of variables as effects. For a "recursive" model, least-squares estimation of single equations would be appropriate even by Cowles Commission canons. The issue then becomes whether a recursive model can do justice to the economic situation it is intended to describe. Partly this is a question of the empirical validity of the lags that make a model recursive. Partly it is a question of the definitional identities that occur in many models; these relationships among variables do not lend themselves to Wold's causal classification, and he does not make it clear how he would either handle them or avoid them.

Chapter 2, however, appears to exaggerate the substance of Wold's differences from the Cowles Commission. The series of "exercises", p. 251/252, introduce various modifications of recursive models and least-squares regression methods

which bring the two approaches closer together. Ultimately, Wold's position amounts to advocating the use of models whose structural relationships are, so far as possible, either recursive or "reduced form" equations.

(2) Part II is an elegant, self-contained, axiomatic development of the theory of consumer demand, both for the individual consumer and for an aggregate of consumers. The specialist in the theory will be interested in the economy of assumptions with which Wold establishes well-known results.

Wold does not regard this theory as one to be tested by empirical demand studies. Indeed he uses theoretical conclusions as constraints on statistical estimates of demand parameters. He even employs, in the analysis of market statistics in chapter 17, theorems on cross-elasticities and on the relative size of income and price-elasticities which, although true of individuals according to the theory, are not, by his own showing in chapter 7, generally true of markets.

(3) The theory of stationary random processes has not, in spite of its obvious relevance to a science which must depend on time series, penetrated far into econometric literature and practice. The logical development of the theory in part III will therefore be extremely useful. It is followed by a development of regression theory, again with the characteristic elegance, generality, and insight due to the author's habit of starting with first principles. The main operational tool that Wold derives from these investigations in statistical theory is a correction of the classical formulas for regression standard errors to allow for autocorrelation of the residuals. (See p. 211, 238–240.) This correction appears to be an improvement over the methods by which econometricians now handle, or ignore, this difficulty in regressions involving time series.

(4) The empirical investigations reported in the final chapters of the book are mainly estimates of income and price-elasticities for food items. The data come from three Swedish family budget surveys, 1913, 1923, and 1933, and from national time series 1921–1939. To the reviewer this report seemed the least satisfactory part of the book. As the authors recognize, the families sampled in the budget surveys were not representative, but self-selected volunteer record-keepers. The analyses are based on data grouped into only three or four income classes. The authors have worried very little about sources of inter-family variation in consumption other than current income and family size, which they measure in "units" according to arbitrary age-consumption scales. They have not considered whether the shifts in Engel curves between budget surveys are consistent with their estimates of price-elasticities from market series. Nor have they endeavored to reconcile their budget-survey estimates of income-elasticities with those they obtain from market statistics. Indeed, in the face of multicollinearity and other time series difficulties, they have preferred to condition their time series regressions by arbitrary assumptions loosely derived from the theory of demand rather than by their budget-survey income-elasticities. That the authors were fairly successful in prediction speaks well for the wisdom with which they tempered their formal statistical results. (See chapter 18.) Moreover, prediction of consumer demand for non-food items may well be a more difficult task than the food demand predictions on which the authors concentrated. Satisfactory explanation of consumer demand will

require, in the reviewer's opinion, that both budget and market data be approached not so much with refinements of statistical method, to which this book contributes greatly, as with more complex socio-economic hypotheses, with which this book, concentrating as it does on the pure economic theory of choice, is scarcely concerned.

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W. S. and E. S. WOYTINSKY. *World Population and Production. Trends and Outlook.* New York 1953. The Twentieth Century Fund. LXXII, 1268 p. $ 9.–.

In den Jahren 1926 bis 1928 erschien in einem damals bekannten Berliner Verlag ein Handbuch unter dem Titel «Die Welt in Zahlen». Sein Verfasser war Wladimir Woytinsky. Das Werk umfasste bei seinem Abschluss sieben handliche Bände üblichen Buchformats. Auf diese sieben Bücher verteilte sich die sachliche Gliederung des Handbuchs, und zwar im einzelnen wie folgt: 1. Erde, Bevölkerung und Volksreichtum; 2. Arbeit; 3. Landwirtschaft; 4. Gewerbe; 5. Handel und Verkehr; 6. Staat (einschliesslich öffentliche Finanzen); 7. Politische und Moralstatistik. So anspruchsvoll der Titel und die Anlage des Gesamtwerkes waren, so erwies es sich – unabhängig davon, dass Konzeption und Realisierung sich gewiss nicht zu decken vermochten – als glücklicher und wertvoller Wurf. Vor 25 Jahren war das Werk zweifellos eine Pionierleistung, um so mehr als es in seiner Kombination von historischer und aktueller Statistik vielfach neue Wege beschritt.

Nach einem Vierteljahrhundert legt das Ehepaar Woytinsky gewissermassen eine erneuerte Version jenes statistischen Handbuches vor. Auch diesmal handelt es sich um eine wohlgelungene Bravourleistung eines Einzelnen (wenn es gestattet ist, die beiden Woytinsky als *eine* wissenschaftliche Person zu werten), doch sind die Autoren diesmal in den Genuss der gewiss nachhaltigen Hilfe des Twentieth Century Fund wie der Rockefeller Foundation gekommen. Diese Unterstützung, die eigene Arbeitserfahrung während eines Vierteljahrhunderts und nicht zuletzt der schier unübersehbare Ausbau der statistischen Dienste und der daraus folgende reiche Strom an «facts and figures» haben es den Verfassern ermöglicht, ein Werk vorzulegen, das fast mit Notwendigkeit jenen ersten, schon sehr schön gelungenen Versuch doch weit übertrifft. Die Gliederung in fünf Teile mit zusammen 31 Unterabschnitten ist dementsprechend ausgebaut: 1. Man and his Environment; 2. World Needs and Resources; 3. Agriculture; 4. Energy and Mining; 5. Manufactures. In einem abschliessenden Band sollen «World Trade and Organisation» dargestellt werden.

Nun ist dieser erste Band ein voluminöses Opus von 1340 zweispaltigen Seiten eines engen Druckes, so dass es sich eher um gut 3000 Seiten Normalsatz handelt. Das ist auch das einzige, was vielleicht an der äusseren Gestaltung dieses Werkes auszusetzen wäre. Für die praktische Benützung wären vermutlich drei Einzelbände mit gleichem Gesamtumfang eher handlicher. Die Hauptsache ist natürlich der Inhalt.

Im Rahmen eines solchen kurzen Berichtes ist es indessen ausgeschlossen, auf Details einzugehen. Bei einlässlicher Durchsicht – keineswegs Zeile für Zeile – fallen nur wenige negative, dafür ungewöhnlich viele positive Punkte auf. Ein Werk solcher Art muss ja reich mit Tabellen dotiert sein. (Sie erdrücken übrigens das Seitenbild keineswegs und sind graphisch recht hübsch präsentiert.) Die Daten sind nach Möglichkeit bis auf 1950 geführt, soweit eben Unterlagen vorhanden sind; dabei gehen allerdings die beliebten «Bevölkerungs-Projektionen» noch weiter, nämlich um ein halbes oder gar ein ganzes Jahrhundert, also z. B. bis 2050. Von diesen Prophezeiungen abgesehen, die nach bisheriger Erfahrung doch kaum eintreffen werden, ist es also eine statistische Bestandesaufnahme zum Zeitpunkt der Mitte des zwanzigsten Jahrhunderts. Dabei ist die Behandlung der Fakten so gut und so einwandfrei, wie es nach heutigem Stand der Kenntnis möglich ist.

Neben 497 Tabellen (zu denen noch recht viele kleinere zahlenmässige Übersichten kommen) enthält das Werk nicht weniger als 338 Graphiken einschliesslich Reproduktionen diverser Art. Zu diesen Illustrationen gehören geographisch-statistische Figuren, wobei als Weltkarte die Projektion von Dr. Erwin Raisz verwendet wird. Diese «Armadillo-Projektion» scheint tatsächlich realistisch, praktisch und übersichtlich zu sein und daneben nur ein Minimum der unvermeidlichen Verzerrungen zu bewirken. Dass die Autoren nicht zögern, etwa einen Holzstich aus dem 16. Jahrhundert einzufügen (zur Veranschaulichung des damaligen Prozesses der Erzgewinnung sowie der Frauen- und Kinderarbeit in diesem Produktionszweig), ist durchaus lobenswert und mag als typisch angesehen werden für die grosszügige und vorurteilsfreie Art der Darstellung. (Ein Bagatellpunkt wäre, dass es diese Grosszügigkeit etwas übertreiben heisst, wenn die gleiche Karte auf je einer Seite zweimal mit nur 50 Seiten Abstand reproduziert wird: siehe die Weltkarte gemäss Bevölkerungszahlen – einmal «*um* 1950» auf Seite LXXI, das andere Mal «*im* Jahre 1950» auf Seite 45).

Unvermeidlicherweise begegnen die Autoren der üblichen Schwierigkeit mit zahlenmässigen Angaben und ihrer statistischen Behandlung für das soziale und wirtschaftliche Leben der USSR und des Ostblocks. Allzu oft, aber doch nicht so häufig wie es vielfach behauptet und befürchtet wird, muss hier eben die Bezeichnung dienen «ohne USSR», oder es werden drei Punkte als Markierung fehlender Daten eingesetzt.

Text, Graphiken und Tabellen sind klar, ansprechend und verständlich; die herangezogenen Quellen wurden mit kritischem Verständnis ausgewählt, und man kann sich hier auf die Vergleichbarkeit von Begriffen und Zahlen verlassen. Die Herkunft des Werkes aus den USA zeigt sich auch äusserlich, und zwar in günstiger Weise in der Vielzahl der Illustrationen aus amtlicher und nichtamtlicher amerikanischer Quelle; so diejenigen des US Department of Agriculture.

Alles in allem eine überaus erfreuliche Publikation. Man darf wünschen, wenn man auf den zweiten Band wartet, dass er die gleiche Qualität aufweist.

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